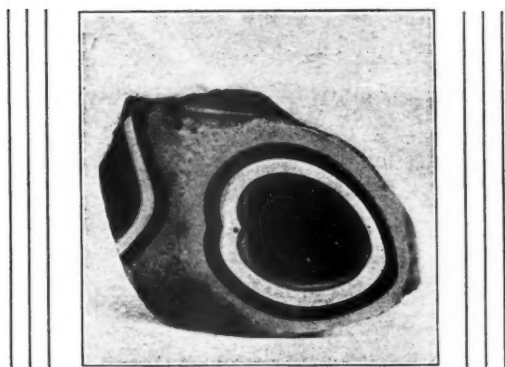


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10th. ANNIVERSARY NUMBER

ROCKS and MINERALS

A Magazine for Mineralogist,
Geologist and Collector



SPECIAL AGATE NUMBER

. Official Journal of
The Rocks and Minerals Association

SEPTEMBER - OCTOBER, 1936

Vol. 11, No. 9

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ROCKS and MINERALS



Edited and Published by
PETER ZODAC

PUBLISHED
MONTHLY

September-October
. . 1936 . .

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ROCKS and MINERALS

PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

CHIPS FROM THE QUARRY

(Formerly the Bulletin Board)

AN APPRECIATION

Ten years ago this month, the first issue of ROCKS AND MINERALS made its appearance. It was a brave attempt at journalism, for the Editor had no experience in editing a magazine, nor even in writing articles while his knowledge of mineralogy was very limited and his financial resources even less so. Added to all this he had never seen a mineralogical magazine so had nothing to guide himself by. It was a case of "Fools rush in where wise men fear to tread." Nevertheless, ROCKS AND MINERALS was safely launched and has been making progress ever since.

It is interesting to record that before the first copy made its appearance, 179 subscriptions had been received, and of this number 30 subscribers are still with us as follows:-

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These good friends have done much to bring about the success of ROCKS AND MINERALS. They have renewed regularly, year after year; have secured many new subscriptions for us; gave us their full support in all our projects, both financially and otherwise; and have encouraged us with words of praise, counsel and advice. They are indeed our true friends and they are very dear to us.

Nor should we here neglect to express our appreciation to the many new friends we have made, subscribers, advertisers, and contributors, after ROCKS AND MINERALS made its appearance. They have truly been most generous in their support of the magazine and it is due to their cordial interest and assistance that the success of ROCKS AND MINERALS has been made possible.

Some of our good friends have left this earth on the long journey to that far distant country from which no traveler returns. Each death of a warm friend brings deep sorrow to our heart and he shall always be remembered. We feel assured, however, that in their heavenly abode they possess magnificent collections of dazzling gems and exquisite crystals and are fully aware of all the mysteries of the mineral world which we poor, human mortals are vainly trying to unravel.

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of the
ROCKS and MINERALS
ASSOCIATION

WHOLE No. 63

FREAK SIMULATIONS IN AGATE

By Ernest Weidhaas

To the lover of agate, a collection of this mineral is a library in miniature, each stone telling its own peculiar story, sometimes puzzling, it is true, but often intriguing, generally fascinating, always beautiful. When anyone asserts that he has enough agates and does not want any more, the remark brings to mind the time-honored; "Why don't you buy him a book?" "He already has a book."

The variations in agate are infinite; and occasionally the striations, inclusions, or other markings are so arranged that freak simulations of fanciful figures are formed by them. When Nature has intensified these with contrasting colors, one of her masterpieces has been created. This mimicry may occur in all types of agate, and these are commonly grouped under one heading as "picture agates" for want of a better term. Moss agate, as its name implies, so frequently resembles jumbled vegetable growth, that it should not be included unless its markings form a distinct and unusual picture. Under the same rule, ordinary eye agates would be excluded from this classification.



No, this is not a target on which the wet paint has started to run; simply a fine example of eye agate.

Photographs by F. H. Pough, AMERICAN
MUSEUM OF NATURAL HISTORY.

Of some of the freak simulations in agate, it may well be said that they are veritable sermons in stone, as the one described by the late Dr.

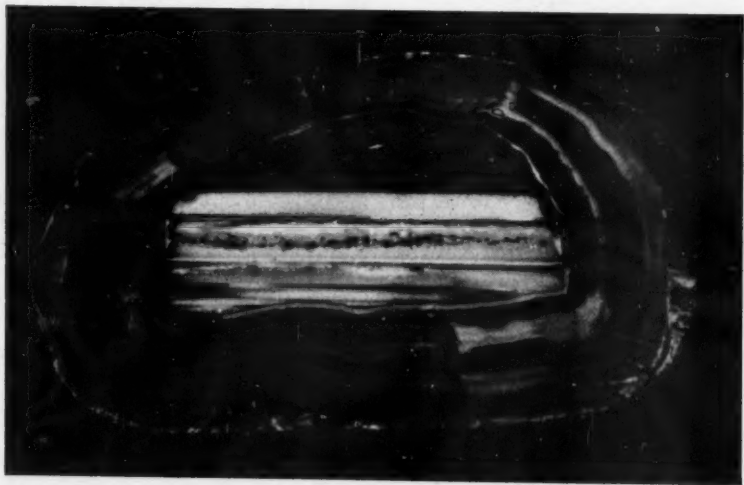


The Praying Madonna, formerly in the George F. Kunz collection. (described in text).

George F. Kunz attests:¹ "One of the most beautiful agates I have ever seen.... is a bit about two and one half inches long and one and a half inches wide. In it Nature, for once a Christain, has formed a lovely Madonna—no doubt about it being a Madonna. As clear, as exquisitely colored—soft reds and blues on a gray ground—as droopingly tender as an Italian Primitive, it glows in the cloudy agate, miniature features delicately marked, tiny prayerful hands, a robe beautifully fashioned—a miracle to make one believe in divine intervention. How, we ask, could an accident be so perfect, even to the sacred droop of the head?"

Needless to say, such agates are not found very often, although the reports of them come frequently enough. Many strange experiences are encountered when pursuing the ghosts of these phantom minerals

¹ Kunz, George F. *American Travels of a Gem Collector*. THE SATURDAY EVENING POST, Nov. 26, 1927.



This beautiful seascape in light blue agate is surrounded by agate of a coppery brown color, so that not only the picture but also the frame has been provided by nature.

which very often exist only in exceptionally lively imaginations. As a rule it requires the second sight of a seventh son of a seventh son to see the resemblance which the owner has described in glowing terms. One such instance typical of many, was following up the report of an agate depicting: "Three Indians in a war dance, to one side, the tepees, in the background, the virgin forest, while in front two more Indians are beating tom-toms." Truly a remarkable agate! The owner considered it too valuable to trust to the mails, or even to have it photographed; so after much correspondence, an appointment to see it was finally arranged. When hunting down freak minerals, it is best to be prepared to discover that the description has been somewhat exaggerated, but imagine finding that this

glorious specimen was an ordinary moss agate ring stone, about one half inch square. The owner had considerable difficulty finding which way the stone should be held in order to see the picture, turning it back and forth in every conceivable position. When he found what he was looking for, he could see not only the dancers and their orchestra, but also a few squaws which he had apparently overlooked on his previous inspections.

However, some really beautiful picture agates that are genuine freaks may be found in almost every important collection. The British Museum boasts of one from Egypt, the natural markings representing a tolerable likeness of Chaucer, the poet. One of the outstanding specimens of



Left—His satanic majesty has posed for the portrait shown by the unaided natural markings in this agate.

Right—The markings in this bottle have been brought out more distinctly by the uneven polishing of the surface. The natural beauty of this agate has been somewhat marred by the lapidary who has cut eyes for the birds.

the Boyce-Thompson collection is a Montana agate in which a group of tree-covered islands is beautifully delineated. Many extraordinary freak picture agates are preserved and highly treasured in museums throughout Germany. This is to be expected when one reflects that almost all the agates in the world are polished in that country.

The ancient Greeks and Romans greatly esteemed those specimens of agate wherein a fanciful resemblance to natural objects occurred. "Pliny relates that Pyrrhus possessed a natural agate in which was depicted Apollo playing on the lyre, and the Nine Muses with their attributes."²

But no one appreciates these oddities more than the oriental lapidaries, who for centuries have been on

2 Emanuel, Harry, *Diamonds and Precious Stones*. London, 1867, p. 171.

the alert for any unusual markings, which they always utilize to increase the beauty of the article which they are carving. This habit is best illustrated by the carved agate snuff bottles which were so popular in China during the Chien-Lung dynasty. Many beautiful natural picture agates may be found among these bottles although the Chinese craftsmen never hesitated to help out Nature by making a small indenture here or raising the surface there in order to enhance the natural marking, this assistance being eventually carried so far that the markings became cameos and so could no longer be classed as simulations.

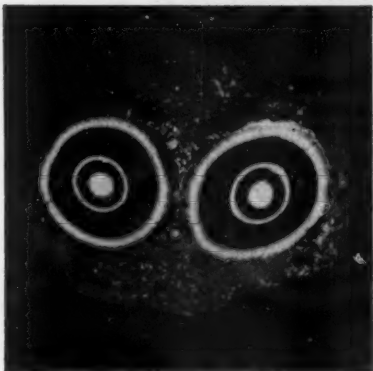
About seventy years ago, just the reverse order was established in Europe and America. The immense popularity of cameos at that time raised the cost of finely carved stones, so



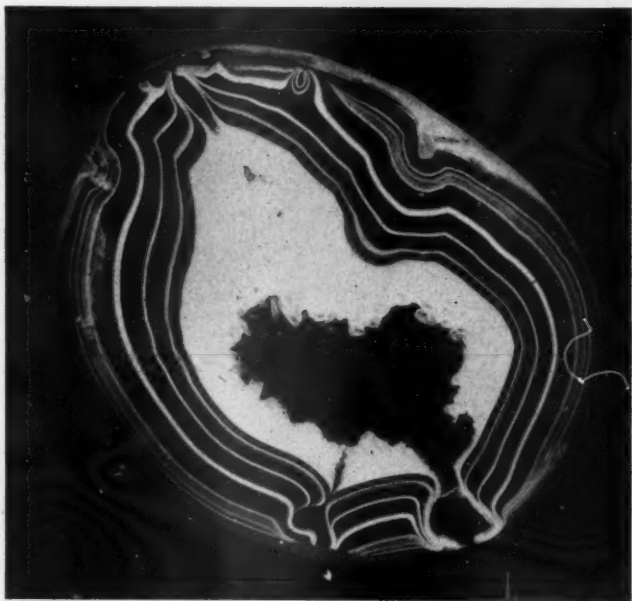
Left—Nature has been assisted by the lapidary in bringing this duck to perfection.

Right—A remarkable likeness of Benny, the comic strip character, originated by J. Carver Pusey, is shown by the natural markings in this agate.

that very often over ten thousand dollars was paid for a single specimen. When a cameo blank was so marked that the artist could not use it in the regular course of his work, he would throw it aside. The great demand for cameos sometimes caused a shortage of material upon which to work, and the discarded blanks were brought out, and their flaws were so used in the carving that at times some really beautiful effects were obtained. Cameos of this type were eagerly sought after by collectors, with the result that the markings became more and more important. It was only a short step from such cameos to flat and cabachon polished stones whose entire claim to value as jewelry was in their markings alone, and a genuine craze soon developed for such agates to be used in rings and brooches.



Mineralogy and ornithology may become related sciences, as the wise old owl in this double agate illustrates.



The little chick that never hatched. Polished cross-section of an egg-shaped nodule.

The rarity of genuine similitudes brought about the widespread use of moss agates; and those whose dendritic structures even remotely lent themselves to resemblances of plants, found a ready sale at high prices, but the demand for "picture agates" was not satisfied until some enterprising although unscrupulous persons took advantage of the fact that agate may be colored very easily, and started the manufacture of improved (?) moss agates. At first these faked stones were regular moss agates to which a tree trunk and ground base were added, but soon it was found that entire pictures could be produced with less difficulty, and then

not only were trees and landscapes etched on plain agate, but pictures were practically made to order. This was done by scratching the polished surface of a plain agate with whatever design was desired and then covering the scratches with sulfuric acid. This would produce a brown or black stain penetrating into the agate wherever the surface polish had been removed. The scratches were then removed by repolishing and although it is doubtful if these agates ever fooled any but the most gullible, nevertheless the fraud not only destroyed the popularity of freak agates but eventually brought about the discontinuance of the use of all agates as jewelry.

«—————»

BLUE AGATE IN WASHINGTON

By C. N. CLINESMITH

Thirty-five or forty years ago, an early settler in Kittitas Valley, Washington, picked up a blue agate. Its unusual color and fine texture aroused his interest. He showed it to his friends and finally took it to a jeweler. Soon the beautiful blue stones were eagerly sought for, to be cut and polished for settings.

It was discovered that the blue agates were found only in one small area, about five or six miles square. In the succeeding years many searchers have tried to trace the stones to their point of origin, but none have ever been picked up outside the limits of this strip of ground.

The writer has spent many hours walking over the land where these agates are found. The location would indicate that they have been washed down from the adjacent hills, as they are usually in the places where wind and water have washed the soil down to the hard pan, and in the gullies where melting snow in spring has cut small channels.

These agates vary greatly in size, color, and quality of the stone. They

are irregular in shape and in every size, from tiny ones no larger than a pea, to pieces four or five inches long and three or four inches wide. The large ones, however, are very rare.

We are told that this one small spot is the only place in the United States where the truly blue agate is found. Also that some have been picked up in South Africa.

If there are, among the readers of *Rocks and Minerals*, collectors who know any other localities where blue agates are found, the writer would like to hear from them.

If every subscriber to *ROCKS and MINERALS* would tell advertisers when writing to them, that he saw their ads in *ROCKS and MINERALS*, the advertising patronage would soon be double what it is, and our readers would get even a better magazine than they do now. Everything is capable of improvement if the expense of such improvement is warranted.

AGATE — SOME FACTS AND USES

By Peter Zodac,
Editor Rocks and Minerals

Agate a variety of quartz, is found all over the world and has been known for centuries. It received its name, according to Theophrastus, from the river Achates in Sicily (now called the Drillo), in the Val de Noto, where it was first found. Agate was very much esteemed by the ancient Greeks and Romans and especially those varieties wherein a fanciful resemblance to natural objects occurred.

Agate has been and is still used for a wide variety of purposes. As a gem for rings, pins, brooches and pendants; for ornaments, fancy boxes, snuff bottles, cups, saucers, plates, vases; in the mechanical lines for meter and scale bearings, phonograph needles, mortar and pestles, dental tools, seal-handles, pen holders, and handles for umbrellas, pa-

rasols, canes, and shifting levers of cars; paper weights, and for a host of other uses of which one very important one is for mineral specimens.

In the April 1904 issue of THE MINERAL COLLECTOR, (p. 25) is a brief item relative to a Chaldean Agate Axe. That the axe was an object of great scientific interest and had been offered to the British Museum but at so extravagant a value, about \$16,000, that offer was rejected. Eventually the axe found its way to the American Museum of Natural History, New York, City, where it now is in the Morgan collection.

One of the writer's earliest recollections of agate was in the game of "marbles" which boys still play. Although good marbles were made of glass, often striped and nicely



A WATER - DRIVEN MILL IN THE NAHE VALLEY, IDAR, GERMANY.

For hundreds of years the small streams which empty their waters into the Nahe River have been lined with numerous water-driven mills wherein all sorts of stones—agates, amethysts and a host of others—have been wrought into fancy shapes for the adornment of almost the entire world.

colored to resemble agates, a real agate was an expensive item (25c) which few boys could possess. Proud indeed was the boy who owned a "real" as a "shooter".

Because of its hardness, fine texture and delicate banding, agate takes a beautiful polish and is a most popular mineral. It has been known for ages. For centuries, the center of the agate cutting industry has been Oberstein, Germany; an authentic record, according to Wodiska¹, shows that this industry has existed there since 1497; and that the industry has for many years been shared by the neighboring town of Idar.

Because of the popularity and wide demand for agate, the deposits around Oberstein finally became exhausted and it was necessary to import from Brazil, India, and elsewhere. It was also discovered that agates and chalcedony could be artificially colored to enhance their beauty; thus poor and rejected material could be salvaged. The in-

dustry in Germany is so well established that cut and polished agates are shipped all over the world often to be sold as "native gems" of that particular locality where they may be placed on sale, although in reality the agates may have come from Brazil.

Emanuel², writing in 1867 stated: "The principal manufactories are at Oberstein, where, however, the supply has fallen off. The rough stones are now brought from the Brazils, India, Australia, etc., coming to Hamburg and other ports in ships with light cargoes as ballast. The numerous specimens termed Brighton, Isle of Wight, Aberystwith, and Irish pebbles, as well as those sold at Chamounix, Niagara, etc., are in reality these Brazilian or Indian agates, and are distinguishable from the Oberstein agate by being water-worn; whilst the Oberstein agates are generally covered with a greenish mineral called delessite, a silicate of iron, and frequently have some of the trap rock adhering to them."

Kunz³ stated that exposure to strong sunlight was long ago found to impart a reddish tint to gray-colored agates, and this method has been used to convert them into carnelians.

² Emanuel, Harry, *Diamonds and Precious Stones*. London, 1867, pp. 170-171.

³ Kunz, George F., *How Gems Change Color*. THE MINERAL COLLECTOR, AUG. 1896, p. 95.



Banded agate (eye agate) - Brazil

None but reputable dealers and firms can buy advertising space in ROCKS and MINERALS. The Editor endeavors to protect both his readers and his advertising patrons. Stick to advertisers in ROCKS and MINERALS when you buy rocks, minerals, and supplies and you won't get "stuck."

If you don't see what you want in the line of minerals and supplies in ROCKS and MINERALS, write to Information Department, ROCKS and MINERALS. We will notify reliable dealers who can supply you and they will quote you fair prices.

HUNTING AGATES AROUND LAKE SUPERIOR

Agates found on beach much prized by local jewelers

By A. JOSEPH ALESSI

The Lake Superior Region is noted for its beautiful agates which are found in a number of localities along the lake shore. Most of them are found as small pebbles which have been washed in on beaches. I never realized how beautiful they were until on a recent visit to the region, I saw in a jewelry store window in Duluth, Minn., agates which sold at 50c for a small glass jarfull. Water in the jars vividly brought out the colors of the stones. I wanted to purchase some of them but the store was closed, due to a holiday. Nevertheless, I was determined to possess a number of the semi-precious stones and so set out to do a little agate hunting on some nearby beaches. Duluth is on the extreme southwestern tip of Lake Superior.

In company with M. A. J. Nisbet, an ardent mineral collector, we camped in a tourist park at Two Harbors, Minn., about 25 miles northeast of Duluth and on Lake Superior. Bright and early the next morning (after dreaming of agates all night), we set out to explore the beach. The first thing we encountered was a sign: "Notice-Gravel Picking on this Beach Forbidden." With such a sign as a clue, we knew that we must be near the spot where those much-desired pebbles were found. Leaving the park area, we strolled along the beach and it was not long before Mr. Nisbet shouted, "I have found an agate!" Believe me it sure was a dandy. From

then on we picked them up right and left, of various colors and sizes.

I soon discovered that the best way to find agates was to scoop out a hole near the water's edge and to wait for the waves to bring in new material. In this manner we collected several beauties; also some carnelians, jaspers, and thomsonites.

From this locality we continued on to other places along the shore near U. S. Highway 61, but we did not find another good locality until we retraced our route and entered the Michigan side of Lake Superior. On the beach at Essey Park, about two miles south of Agate Harbor, agates were plentiful. Here we also found them in matrix and in the form of unbroken pebbles. In about an hour and a half we each collected about four pounds of agates.

My companion had a hard time in persuading me to leave this place. But it was getting dark and we had to search for a place to pitch our tent and so had to leave. We later found agates at other points on the Lake shore, at the tourist park near Cross River on U. S. Highway 61, and at Gull Point on M. 64 in Ontonagon County, Michigan. Someday I shall go back and hunt for more agates.

Representation . . .

in a high class mineralogical journal like ROCKS and MINERALS is a business asset of inestimable value.

"AGATES" AND SUCH

Some Pertinent Comments by an old dealer

By A. J. HARSTAD

The literature of the agate is meagre. The popular books on semiprecious stones do not give it much space and the scientific books give it less. There is a vast amount of misinformation in circulation and a great vacuum in the way of lack of information. Coming at this particular time, this series of special Quartz numbers by ROCKS and MINERALS MAGAZINE is timely and the most constructive effort undertaken in the semi-technical field. Especially timely in view of my experience which has been that most of the recently recruited mineral collectors term as agate any rolled pebble that shines when wet regardless of whether it is agate, chalcedony, jasper, chert, flint or even a bit of country rock with a veinlet or two of white quartz through it. So far I have seen nothing in contemporary publications that was calculated to set the beginner right in these matters. It will be of no service to mineralogy or mineral collecting if hundreds or thousands of young people or older beginners are brought into this field if they are going to be allowed to become lost right at the very start in what is probably the most elementary branch of all mineralogy, the crypto-crystalline quartz gems. Therefore, I am happy to contribute what I can from my experience and as others will write of special features my articles will be general in scope and I will begin with—THE NOMENCLATURE OF THE AGATE.

THE NOMENCLATURE OF THE AGATE—All that I have read leads me to believe that the ancients intended the name Agate to mean the **Banded** variety of chalcedony only. I may be wrong in that conclusion but think I am right in stating that for the best interests of everybody concerned there should be a standardization of the names in this field and the name agate when used without any qualifying term should be reserved for

the banded varieties exclusively. Personally I would go further and ban "agate" from all such terms as moss agate, cloudy agate, etc., and put these substances where they really belong under mossy, or better still dendritic chalcedony, cloudy chalcedony, etc., but of course centuries of usage may make this impossible. This puts my opinion in conflict with most of the big names in mineralogy but let me call your attention to something, the significance of which may have escaped you and that is if you go through the books bearing these same big names you will find that very few if any of them gave those crypto-crystalline quartz gems any more space than was absolutely required to get them into the books at all. Have you read anything that indicated the authors gave these substances much independent thought or research? The reason of course is that they were mainly concerned with crystallized minerals for which I do not blame them. But that is no reason why the present day collectors should keep on wandering around in a daze. Let's hear from others on this subject. Regardless of what may or may not be done in this regard there is one reform that should immediately and ruthlessly be put into effect and that is to bar all such names as deer hair agate, coral agate, flower agate, tree agate, rutile agate (whatever that is), red top agate, straw agate and all the rest of the long list of misleading names. These may serve very well for sales ballyhoo but they can be nothing but a real detriment to mineralogy and mineral collecting. Especially so the names that indicate to the uninformed that the inclusions are animal or vegetable substances. I have never seen organic inclusions in chalcedony and do not recall of any real authority stating that such things are a fact. To stave off the expected criticism of this statement, I will say that I have seen quartz

with some really nice patterns of organic matter in it but—it came from the outside, into fine crevices in the form of the moss or fungus growth or whatever it is, that in the prospector's parlance is known as vegetable stain. So make sure that your experiments were conducted with real inclusions, wholly included in the quartz, before you go on record. If any real authority has any information on this subject it would be a valuable contribution to this series.

Another field where some reforming is indicated is in the long list that is now beginning to appear of purely local names for different quartz minerals. If I remember my Dana correctly, it lists upwards of forty varieties and sub-varieties of quartz. I think that most of the quartz minerals that are being found today could still properly be referred to one of those forty varieties. Because the markings on a piece of jasper from one locality run SE and NW and the markings on a similar piece from another locality run SW and NE does not mean that they are two different varieties of quartz each deserving of a special name. Let's keep agates and the other quartz gems on a higher plane than that of mere "Tourist bait".

The term "water agate" might well be dropped too. In the first place I think all of them are chalcedony, pure and simple. In the second place, which may be news to those of you who live where these are found, the term "water agate" in most other places simply means an agate found in the water. There are two special names for these, enhydros and hydrolite. Both of them have standing. I think hydrolite is the smoother term to use but I see that "enhydros" by some chance has broken into print lately and if it can supplant "water agate" it is O. K. with me. These specimens are subject to two weaknesses, they will burst if exposed to freezing temperatures and many of them will in time dehydrate. I know from bitter experience. As I am not a collector I have not experienced with any oils, shellac or other coat-

ing intended to prevent the drying out but if you have tell it to the readers of ROCKS and MINERALS.

Another reform that might well come under this heading is to limit the term agate strictly to specimens of amygdaloidal origin. In the beach pebbles this might be hard to determine at times but that is not the point. What I am after is to eliminate the offering or selling of chunks of mixed chalcedony and jasper broken off a rock reef as big as Madison Square Garden as—agate. To qualify as an agate the specimen should be a nodule or part of a nodule except of course in the cases of true "vein agates" which will be discussed in a later chapter.

I don't really expect much reform to come of this effort but it would be quite a relief if the time would come when I could read of a new mineral named, Jerusalemite or some such term, and not eventually find out that it is the same old red and yellow jasper that I have stubbed my toes on in nearly every state in the Northwest. Anyway if this undertaking by ROCKS and MINERALS will eliminate the publishing of purely rhetorical ravings about agate when the experienced reader knows that what the writer is describing is mainly jasper, mud colored chalcedony and maybe a few sandstones and quartzites thrown in, it will help a lot. And now for a little discussion of QUALITY IN AN AGATE.

QUALITY IN AN AGATE. One important factor in the quality of an agate that is not even recognized or else overlooked by the new crop of agate enthusiasts is that of translucency. Because of other features an agate might be good even if not appreciably translucent but it would be a still better agate if it did have translucency. The purpose of the score or more of coats of varnish on the old time furniture, pianos, etc. was to furnish "depth" to the finish the better to display the beautiful grain of the wood. The depth of the translucency of the agate or any other quartz gem for that matter is what makes the

natural beauty of the color, bandings or markings stand out to the eye. Most collectors regard the bloodstone or heliotrope as an ugly mineral and from what I have seen of samples of modern American finds I don't blame them. A good bloodstone however is a different matter but in order to be good, in addition to being pleasing green with an even distribution of bright red markings it must have translucency at least deep enough to appreciably pass light through the thickness of an ordinary cabochon gem. Most of the bloodstone being offered today will not pass light through the thin edge of a chipping. The same applies very much to the agate. To be really translucent an agate slab an inch thick should pass light through it and except where it is milky or colored you should be able to read print through a quarter inch of thickness. Now hold your prized agates up to the light and see where they rank. I think that most of the alleged agates we read about now a days will shut off light 1/16 to 1/8 of an inch under the polished surface. Sometime ago one of the new crop of writers gave a list of localities where good agates are common. Some day it will dawn on this writer that good agates are rare and certainly not cheap. Other factors in the quality of an agate are color, bandings, markings, shape, freedom from flaws and, if polished, the quality of the workmanship. While locality is not necessarily a factor in the quality it might be in the selling price. An agate found wanting in one or two of those factors might still be a fairly good agate but if wanting in more or in all of them it would be a worthless piece of property. As far as color or markings are concerned these should be either in bold contrast or pleasing harmony with the ground mass or back ground. A vague arrangements of drab greys, dingy browns, dirty yellows, etc. is not quality. Bandings should be an arrangement of fairly narrow bands made up in turn of narrower bands and either in bold contrast or a gradual harmonious blending of the colors. The faithful following of the outline of the nodule or irregular and fanci-

ful turns and curves are desirable. If the bands are straight and parallel it is onyx and not agate and not so interesting. If the center is filled with crystalline or crystallized quartz, rock crystal or amethyst the appearance is often enhanced as it also is if part of the bandings are straight or onyx. In the case of imitative markings they should be true enough to what they are supposed to represent, so that the viewer can see what the enthusiastic collector tells him he should see without calling on all the imaginations in his family for generations back. Size is of course important in that the smaller the agate the less of beauty it returns to the eye. Exceptions are known but unless it is exceptional material a polished surface less than 6 to 8 sq. inches is hardly desirable. Freedom from flaws is of course a mark of quality but I would not relegate an otherwise good agate to the ash heap merely because it had a few checks and cracks. Finish is a matter of craftsmanship and a good agate with poor finish could of course be worked over. Shape is a matter of individual preference. Some like trued up square or rectangular pieces, others like slabs or half nodules. The quality factor there would generally lie in the manner in which the cutter had taken advantage of the natural features of the material such as centering markings, cutting out defects, etc. Locality is important from the collector's standpoint in the case of a locality of limited or closed production. The factor of quality will be touched upon further in the next chapter AGATES I HAVE MET.

AGATES I HAVE MET . . . It is of course fitting that I begin with what I consider to be pre-eminently the best agate in the world. Remember now—this is referring to localities and what might properly be called the "run of the locality", and not to individual specimens. An occasional fine agate is sometimes found in localities that on the average produce only mediocre or poor specimens. With that explanation I place the crown on that type of agate generally seen labeled as from Lake Su-

perior but that may have come from one of the many streams and lakes in Northern Minnesota and Michigan. I wonder if that dull angry roar I hear could by any chance be a reverberation from the Pacific Coast beaches? And that reminds me—a couple of years ago I sent some minerals to an amateur gem cutter in California among which were a couple of these agates. He bought all or most of the other minerals but he returned the agates to me with the astounding piece of information that the Pacific Ocean was full of them. What this collector didn't know and what probably 90% of the rest of the newly joined collectors and quartz authorities don't know is that this is one of the very, very few localities in the world where a large amount of good quality, highly naturally colored, well banded agate occurs. In fact the localities are so few that I know of only one other and I am not so sure of the authenticity of that. In my many years experience in this field, I have come across a number of agates labeled Assouan, Egypt or simply Egypt. Now—while two specimens of the same species or variety originating from widely separated points may be identical as far as scientific tests are concerned, the experienced collector knows that there generally are differences distinguishable only to the trained eye. Witness—if you are an old timer you may recall prospectors who could tell with an amazing degree of accuracy where a gold nugget originated merely by looking at it. This applies to mineral collecting in many ways. However I have never been able to see any difference between the agates labeled Lake Superior and those labeled Egypt unless it would be that the latter averaged darker in color. Of course I am old enough in this game to know that it is common practice to ship gems from one country to another, generally to some place in the far East where they are in turn sold or exported as of local origin, but this practice is in the main confined to polished gems and most of the supposed Egyptian agates that I have seen have been in the

rough. I am unable to find any extended or satisfactory reference to this agate or the locality in my books. If you have any information on this it would be a valuable contribution to this series. I understand that Brother Dustin is to write a special article on the Lake Superior agates. I have known him for years as a real gentleman and a discriminating collector of minerals. Therefore while I will be glad to read his article I feel so certain of what he will say that I "cross my heart" that there has been no collaboration or consultation between us. As far as I know he has none of these agates for sale and I haven't over a couple of dozen so this is not sales ballyhoo. Certain that Brother Dustin's article will explain why I term this agate the best in the world I will pass on to another locality, famous for fine agates—The Birkenfeld district in Germany. This locality is probably better known as Idar or Oberstein but I have reference to the agates originally mined there (and I mean mined, they tunelled for them) and not the South American agates that are being worked there now. Many of these agates were well banded but they were notable chiefly for the beautiful association with amethyst and the wonderful cavities and impressions after crystals of other minerals. I will describe one on my desk now. No—it is sold so this is not advertising. Imagine the conventional design of the old fashioned bee-hive divided vertically down the middle. The half cone is six inches high and about four by five inches on the base. About half of it is a core of chalcedony surrounded by a thick layer of banded agate, then comes a layer of green chalcedony and from this, covering the outside of the specimen, are thickly implanted, deeply colored amethyst crystals up to about $\frac{3}{8}$ inch in size. And—right in the center of the chalcedony core are cavities after aragonite crystals averaging about $\frac{1}{2}$ in. in width and two to three inches long and the cavities are smoother and sharper in their walls and angles than any die cutter could cut them. What wonderfully interesting and beautiful slabs

this would make but of course death would be the only proper punishment for the man who would start a mud saw in such a specimen. Another from this locality comes to my mind. This was agate pseudomorphous after aragonite crystals by infiltration. Originally this had been a group of long, slender aragonite crystals protruding at about a 20 degree angle from a base about 3x4 inches the whole specimen being about 2x3x4 inches. Each one of the crystals had been duplicated, sharp and bold, by red and white banded agate and the base would polish about 8 to 10 sq. inches showing the bandings as would the tips of the crystals. Possibly unique, I used this specimen as a trial balloon to see how far some of the recruits had come in appreciation of the agate. No sale. The first real collector I offered it to snapped it up and thanked me for letting him buy it. The cavities after other minerals that many of these agates show border on the marvellous. The old labels in old German script are almost as interesting as the agates. I will quote a couple. "Chalcedon pseudomorphose Galgenberg b/Idar" "Chalcedon, peri-pseudomorphose, nach Kalkspath, aus Fraisen b/Idar". Many of these agates have a characteristic greyish to violet or greyish violet color which is as close as I can come to describing it. While all the rough agates I have seen from this locality have been the ordinary chalcedony grey in color and many of the polished ones have been this violet grey, I still doubt that those have been dyed but as all of them had been very old specimens they may have been the result of some of the early attempts at dyeing. This locality also produced much in the way of interesting jasper and chalcedony. Also amethyst geodes with calcite and aragonite crystals.

While we are over in that part of the world we might as well take up another type of agate that should have a monograph instead of a paragraph. I refer to the brecciated agate commonly known as the Saxony agate and that has been found there in two or three localities. This is a

red and white banded agate within some specimens an association of amethyst or rock crystal and spots or globules of probably iron oxide. As far back as the banding alone is concerned this agate is probably in a class by itself. With the unaided eye I count 30 band, in $\frac{1}{4}$ inch in the specimen before me. How many the microscope would reveal I can only guess at. The specimen is about three inches wide and almost uniformly banded across the width. The bands are wavy and I count up to 50 waves in one inch of length. The wonderful part of this type of agate however is the brecciation. They are made up of re-cemented angular fragments of banded agate, the fragments in those I have seen ranging probably from $\frac{1}{2}$ to $1\frac{1}{2}$ inches. Now it is nothing out of the ordinary to see minerals that have been broken and cemented together again by Nature, but I have seen specimens of this agate with none of the fragments having the "dip and strike" of their bandings in conformity with the "dip and strike" of the bandings of the adjoining fragments and the junction between them so close that no cementing material was distinguishable to the eye. That is something for you to ponder over. And that reminds me of something else. I suppose most of you have thumbed through Farrington and Kunz and the later writers in search of agate lore but probably most of you have missed the 9th lecture in Ruskin's "Ethics of the Dust". Better read it, it might do you some good. This Saxon agate is considered a "vein agate" that is that it has been formed in small veins or in greatly elongated lenticular cavities.

Of the later agate discoveries there is one that is outstanding and that merits further consideration. That is the delicately colored blue agate of the Mojave Desert. I do not know how much of a producer this locality is now or what it might become in time but the agate itself is of outstanding quality and ranks well up with the best agates of the world.

The agates from Brazil and Uruguay are grand agates but as the reference works give these more space than all the others together I will not take any space to describe them. As this chapter is devoted only to the true, banded agate of good quality from localities of extensive past or present production, I will close by stating that there are many other localities that have produced a limited amount of good agate and others that have produced an unlimited amount of poor agates and very few if any of them would be deserving of any extended mention.

WHAT WILL IT FETCH?—No doubt most of you have read some items about a bit of carnelian, onyx or such, in the cases of a museum or a private collector and valued at hundreds of thousands of dollars. Probably a fair valuation at that. You can put it down as a safe bet however that the value of the mineral itself was probably not over 1/1000 of that stated value. The rest of the value lay in the carving or other workmanship, historical association or archeological interest. Divide a four bit carnelian pebble between a recent graduate from the Howard Monograph and an old time cameo cutter and the difference in the value of the two finished products might easily be a small fortune. Most of the quartz minerals we are considering are among the commoner minerals and as such are also among the lowest priced. Of course all of these things have a value or maybe I should say—a price. The price of much of it that has been sampled to me would be best expressed in units of the ton F.O.B. the stone crusher. However, anything that is really suitable for polishing or for cabinet display has some value and for the general run of agates and most of the other quartz minerals we are considering, that price would probably be properly located at somewhere between .05 and .50 per lb., to the producer, depending upon quality. There is only one crypto-crystalline quartz mineral that rates a price by the carat and that is I'll let you do some guessing and tell you what

it is in a later chapter. There are a couple of others that in fine quality might rate a price by the ounce. But for the ordinary run of "Agates and such" the pound is the proper unit. Of course, here comes the memory of the man who a few years ago offered me kinradite at some cents per—carat. Using even figures, let's do some figuring for the beginners. I think he asked .10 per carat but let's figure it at .05. That would make about \$7.00 per ounce or \$112.00 per lb. avour. A fairly good price for kinradite under any economic circumstances. The tendency with amateurs is to overvalue their rough material. Really all that the majority of this stuff is worth is fair wages and expenses for the man who gets it out and a fair profit and expense percentage for the dealer who sells it. The producer should make sure of his market and prices before he goes in too deep in time or expense. There is not nearly as much new in this field as the average beginner thinks there is. Because a certain type of jasper, chalcedony or such may be quite rare in one locality is no assurance that an almost exact type is not being used as road ballast in some other place. Of course fine or exceptional material is another matter but I am referring now to the general run of stuff that is offered to me and I suppose, to other dealers. Once in a while I get a letter from someone who makes some kind of a reference to a "market" or "catalog" value of these things. Brother, "there ain't no such" values. The only standard of value we have is the standard arrived at by the employment of the experience and knowledge plus—the integrity of the dealer who buys and sells them. Naturally in the rarer material the old law of supply and demand will be an additional factor. These by-the-way are also the only standards of value we ever will have. In almost all cases the last person in the world to properly value such material would be the person at the locality—if he knew only that one locality. And here let me bring out one hurdle that the proponents of the "standard mineral catalog" probably never considered. It is assumed

that any such catalog to be of any value should be reasonably complete. Would 50% complete be satisfactory? Well, let's say that 25% inclusive would be. A 25% inclusive catalog of the quartz minerals alone would make a book alongside of which the Dana 6th edition would look like a vest pocket note book, and that Dana costs \$15.00. Subscribers, form a line but don't crowd. Enthusiastic missionaries are claiming or predicting from 5 to 10 thousand converts to this field. For fear that we would wake up to find that many of the 5 to 10 thousand had had a hand in the making of the proposed catalog. I suggest that we divert the required time, effort and expense to a far more vital need, the building up of a well supported NATIONAL magazine. The present and future value of your mineral collection or deposit depends more upon this than it does upon what anyone's idea of a mineral catalog may be.

In polished material a fair price for the labor and expense of polishing in addition to the value of the rough is of course right. Another permissible allowance would be for waste of rough material and in some cases the risk of spoiling a good rough specimen to make a poor or indifferent quality polished one. Again cautioning the inexperienced producer to go easy with his time, money and hopes until he gets proper assurances from competent authorities, I will pass on to THE IRIS AGATE.

THE IRIS AGATE . . . Much of what has been claimed for this variety comes under the qualifying classification of "interesting if true". Claims that this is the only gem mineral that returns the visible spectrum to the eye are of course balderdash—if I have spelled the term correctly. That there is anything new or recent about it is also not in accord with the facts. However, it seems to be what the mineralogist term as a 'good' variety. It is true agate without any doubt and while the reason for the ceremonious christening as Iris agate when it has been known for gener-

ations as the Rainbow agate, is unknown to me. The name Iris is neither a localism or far fetched so there can be no particular objection to it except on the grounds of virtual duplication. Of course this was old stuff to me long before the Western horizon began to flash with prismatic color play and no doubt old stuff to many of the rest of you, but when I started to write this I thought I had better look up chapter and verse. So in order to get plenty of priority I reached first for Feuchtwanger, 1st edition, 1838; I quote from it, "Rainbow agate—The curved stripes have the property of displaying the rainbow colors when held toward the sun or candle light and the more distinctly if the stone is cut very thin." Strange to say, I found no mention of it in Farrington or Kunz "Gems and Precious Stones North America" though I may have missed it. This may account for many people taking this as a new thing as they may have figured that if these two books did not mention it, it did not exist. However, I looked through some more books and in Goodchild 1908 I found this: "Thus agate in a thin section across the bands acts as a diffraction grating when held to the light and produces a spectrum."

While this agate is not common I am wondering if the scarcity is not due more to a lack of knowledge on the part of most of the cutters than to scarcity in nature. The other day a Montana cutter dropped in on me and showed me a finished gem of the Montana scenic agate that quite by accident had been cut so that it showed the rainbow effect. Upon questioning it developed that this had been cut from a fairly large piece the balance of which had been discarded and had the cutter realized how this was going to turn he might have cut up to a few dozen Iris agates from the discarded material. I am not a cutter but I assume that to get this effect the polished surface must be at a certain angle in reference to the banding and if it is cut in any other way the color play will not show up even if the agate has the property of showing the color play. Maybe

some experienced cutter will tell you more about it but in the meantime if you run across any translucent agate with thin, closely spaced bandings, try cutting some of it in thin sections at about right angles to the bands or other experiments along this line. Incidentally the agate mentioned was one of the few scenic agates I have seen that did not require a rubber imagination to see the rainbow in the sky above the forest scene. So the Iris agate has my blessing if that means anything but let's tone down the high pressure a bit.

While not pertinent to this, it may be interesting to quote further from Dr. Feuchtwanger as to U. S. localities which he gives as Conn., Mass., Ohio, N. J., Miss., and Fla. Remember that the actual writing of the book took place probably 100 years ago. He gives also as the best agates those from Oberstein, Iceland and Faroe Islands. Now, how many of you have seen agates from Iceland and the Faroe Islands? Not many, I venture. Well, they are beautiful agates and as far as the ordinary greyish chalcedony colored are concerned may easily be the most beautiful of all. Those that I have seen have been more toward the greenish tinge than the grey or blueish grey of the ordinary plain agate and this together with the superlative translucency of many of them make them objects of real beauty even in the absence of any striking coloration. In fact, they are in many instances so striking that I am inclined to suspect the presence of a little water in that silica—opal—if you know what I mean. In the absence of definite tests or information I will have to keep on considering them as agates. By the way, if you ever get a chance to purchase one of these, don't expect to get it at the same price as modern beach combings. Now for a few remarks on the MOCHA AGATE.

THE MOCHA AGATE . . . Also known as moss agate, this is one quartz gem that absolutely requires cutting in thin sections to bring out its markings. The chalcedony is a

"moss" a darker green. In thick section light grey or greenish grey and the tints, the color of the markings blend too well with the color of the chalcedony to make these markings stand out boldly. The beauty is best brought out when cut into plates and these fashioned into ornamental boxes, cases, etc., or incorporated in lamp shades or other ornamental objects where the light can pass thru them. I have seen these with bright red "moss" and with both the red and the green in one piece. However, when I do see any of these, I instinctively think of Oberstein and the dye vats. Does anyone know for a certainty that these occur naturally in a red color? I am referring now to those that originate in India. By the way, the reference works give us but little either on this locality or on this type of agate itself. Most of the references are very unsatisfactory, particularly as to what the inclusions were or are. Anyone who has made any research into this or knows of any such research is invited to write it up for ROCKS and MINERALS. Here again is emphasized the need for better classification in this field. We have three major types of chalcedony going under the same name—"moss agate." The Mocha, with a more or less bunched, fibrous marking; the Wyoming type of moss agate with delicate dendritic markings; and the Montana type of scenic agate with the more solidly colored and imitative markings. And—of course, none of the markings are due to moss. Maybe some of the more imaginative of our fraternity can dig up an agate with a Blue Eagle in it, around which we can rally to form a code of fair terminology. Out of all the samples that have been submitted to me, I remember seeing one or two of the Mocha type from Washington or Oregon that in every respect except size was equal to that from India. If it can be produced cheaply enough and in good quality in large pieces, it should find a fairly ready market. Most of the material that is sampled to me as moss agate is worthless. While it may show some interesting patterns on the thin edges when held up to the light, it lacks

the required translucency and would have to be cut so thin as to be too breakable for any use. Much of it is moss jasper and little if any is of amygdaloidal origin. And that reminds me—some years ago, when he was figuring on starting some amateur gem cutting, genial Earl Standard of Kern Co., Calif., sent me some samples of a local material and asked me if I thought it would be worth working. I diagnosed it as a mixture of chalcedony and jasper with some markings in it but too nearly opaque and too poor a color to be desirable. However, a few days ago I received in exchange for other minerals from another man 3 or 4 pieces of this same material traded to me as—agate. Taking time out for a little comprehensive cussing I will resume with a few sidelights on ROUGE and LIPSTICK.

ROUGE and LIPSTICK . . . As between an uncut diamond and an undyed grey agate, the latter is far more interesting to the eye. To bring out the hidden beauties of both requires that one be cut and polished according to certain definite angles and the other be artificially colored. I am not going to attempt to argue the ethics or lack of ethics in merchandising or collecting dyed agates but merely to bring out to the point that both the agate and the diamond as well as many other gems require some touching up by Man to reveal their full and latent beauty. Personally my stand has been as long as these dyed agates are not palmed off as naturally colored they are legitimate merchandise in this field. Particularly in view of the fact that so many other "doctored" gems are freely accepted. Many rough gem minerals are becoming scarce. Keen, trained minds with plenty of backing are constantly working on methods of making second grade rough material suitable for cutting and polishing. For any dealer or collector to keep up to date with developments in that line is probably out of the question. With some substances, such as the agate, zircon, pinked topaz, etc. the practice is a matter of

common knowledge. With others, little if any definite knowledge is current. Of course the specimen should be a natural mineral and correctly classified. The purely man-made imitation or the masking of one mineral to make it appear to be another and unusually a rarer mineral should of course be taboo.

The processes of dyeing are so fully described in the standard reference works that I will not go into it here beyond stating for the beginner that the practice as far as agates are concerned is mainly and probably wholly confined to those originating in Brazil or Uruguay and that any highly colored agate labelled as from those localities can be reasonably safely assumed to have been artificially colored.

Beyond that the trained eye will generally identify these dyed agates I know of no test that would enable the beginner to distinguish them in a fully polished piece. I note that one of the later contributors states that the dye does not penetrate far and that a slight chipping will reveal that it has been dyed. Now—while the agate is far from a fragile substance it has happened that several I have had were accidentally broken or chipped and I do not recall of a single instance where the coloring did not penetrate. The slabs with unpolished edges or the half nodules would be a different matter. As it is hardly possible that the inside could be dyed without affecting the outside, if a colored agate retains the usual grey to white outside shell it is reasonably safe to assume that it is a naturally colored agate. And that reminds me—some time ago I received a request for advice on artificial coloring of Montana Agates. In case others should be considering the same thing, I will answer by asking two questions—If it is a poor Montana agate how will dyeing improve it; and if it is a good Montana agate, in the name of all that is great in silica, why dye it? The banded Brazilian agates are a different matter, the natural color of the bands range from white to light grey. and these

colors blend too well to allow the bandings to stand out.

The altering by dyeing of ordinary milky or grey chalcedony to imitate carnelian, onyx, chrysoprase, sardonyx, etc. is a general practice in the German agate cutting districts. The practiced eye will generally spot these but again I know of no easily applied test that will help the beginner to distinguish them except the price. While a high price would not necessarily mean a genuine, undyed stone, a low price is practically absolute proof that it is a dyed or altered substance. I think I can safely make the assertion that any of these things that sell for a few cents each in finished cabachons, etc., are dyed. There is also some activity in the dyeing of one mineral to make it look like another—dyed chalcedony to imitate lapis, for example. Such things are of course absolute fakes and should find no place in the cabinet. So that when it comes to artificially colored gem minerals, the Brazilian agate is a mild offender indeed. The beginner might be interested in knowing that some of the rough material in circulation, both crystallized and otherwise has been doctored as far as color is concerned.

I am wondering if you have grasped the real meaning back of all this activity in dyeing and doctoring these substances. Can it be for any other reason than that the natural material in fine color and quality is scarce? Now for the next chapter which will be concerned with things—OF THE FLESH.

OF THE FLESH . . . As you dip deeper into mineralogical lore, you will note that the ancient mineralogists and naturalists hit upon some very apt allusions in naming or describing many of these things. Witness—"horse flesh" ore for bornite, and if you are an A. E. F. veteran and remember the horse meat hanging in the French butcher shops I need offer no further evidence. Carnal—of the flesh—Carnelian—and you will find no better standard of

comparison for color in carnelian than to take a look at your own quivering flesh the next time you lose some skin on the carborundum wheel. Deep, pure red and great translucency is the standard for good carnelian. A slight variation in color in one specimen or as between more than one, might be admissible provided the colors stayed within the red and did not grade to orange or brown. Much of the material offered as carnelian today is either a dyed chalcedony or a natural chalcedony or "cloudy agate" ranging in color from milky through yellow, orange, red and brown. I remember one recent writer mentioning a locality or two where carnelians were plentiful. That writer had just simply never been introduced to a **real** carnelian. The Lake Superior district produced some good ones and maybe some are found there still. The number of other U. S. localities producing good carnelian is limited as is the production of those localities. The ordinary beach pebble material offered as carnelian is generally too yellow or too brown. Very little if any of it is good carnelian. You will remember I promised to name some quartz minerals that might rate a price by the ounce. Carnelian, sardonyx and bloodstone is the answer. But—remember also I said **FINE QUALITY**. The one that would rate a price by the carat is—Chrysoprase. Wait a minute before you go weighing yours up. The kind of chrysoprase I mean would make an emerald sit up and take notice of competition. Now weigh yours up if you want to. And that reminds me—I'm waiting for the day when some of you California collectors grow up, quit messing around with beach pebbles and strike out for the Visalia country and dig up some more of the chrysopal that came from there years ago. The best of that was stuff that just needed a little dressing up to hold its own in almost any company. The highest grade was clear as glass and a good green and if I remember correctly some of it was clouded with white and would make acceptable semi-precious gem ma-

terial. It is regrettable that good carnelian and chrysoprase are so scarce. From the standpoint of beauty alone they are top rank minerals.

BETWEEN THE ACTS . . . I am not writing this series to air what I know or maybe only think I know. Aside from passing on what knowledge I may have gained in these many years, I am chiefly interested in stirring up some of the rest of you to come forward with comments, suggestions, and contributions. There must be many of you who have authoritative information as to many of the less advertised localities of agates and such. Also many who can make original contributions as to the many points I will raise in this series. Let us have them. Any trained scientist with the proper equipment at his command who wanted to make some research into some phases of this subject would no doubt get plenty of co-operation in the way of material for experimental purposes or

general data as to localities and occurrences. A committee selected from the more experienced, to arrive at a standard classification and terminology for these quartz gems might be a good thing to consider.

Let us get away from the ballyhoo and bunkum and put these things on a plane of dignity commensurate with the position these substances hold in the field of Natural and Human history. Above all let us get some ORIGINAL matter into print so that it can be preserved for the future. ROCKS and MINERALS MAGAZINE is the ideal medium through which to do this. If you can't contribute anything else, surely you can contribute a subscription or two. All the space that ROCKS and MINERALS can spare for five years is not enough to thoroughly cover the subject. More subscriptions mean more space and the quicker we will have an up to date reference file on "Agates and such".

«—————»

SOME EARLY AGATE OCCURRENCES

Extracts from "An Elementary Treatise on Mineralogy and Geology"

By PARKER CLEAVELAND

Boston, 1822

In New Jersey, near Patterson, in greenstone, and in most of the greenstone hills of that State. They are zoned, generally in nodules, often in geodes, lined with minute crystals of quartz. The outer zone of the agate is sometimes light blue, while the interior is nearly white, and embraces a globular, reddish brown nucleus. (p. 272).

In Connecticut, at East Haven, either loose or imbedded in secondary greenstone, with chalcedony; these agates either oval or conical, usually consist of bands of chalcedony and quartz, variously striped, or spotted, or interlaced with Jasper, carnelian and cacholong. In the same rock occur geodes, frequently composed of quartz only, and lined with small crystals of quartz, trans-

parent, or amethystine, or smoky or yellow, and sometimes spotted or tipped with red jasper. This locality of Agate was discovered by T. D. Porter. (p. 273).

In Massachusetts, at Deerfield, 1 mile east from the Academy, in greenstone; they are composed of chalcedony, carnelian, sardonyx, and cacholong, variously disposed in bands, or interlaced, and sometimes embracing quartz at the center. They vary in diameter from half an inch to three inches. All the foregoing minerals rarely occur in the same agate. (p. 273).

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AGATES OF THE LAKE SUPERIOR REGION

By FRED DUSTIN

There is no member of the mineral kingdom of greater interest than quartz for it affords water-clear prisms of rock crystals, nodules and slabs of opaque jasper, the translucent varieties of chalcedony and opal with its marvelous play of color and flashes of fire.

In the chalcedony branch of the family, we find agate with its wide variety of color and endless patterns. Iron seems to be the great colorist, although chrome and manganese are sometimes active in tinting agates, while occasionally there is a total absence of color, the nodule showing its concretionary origin by delicate white lines in an almost clear mass of amorphous mineral.

Generally speaking, the agates of the Lake Superior region are not of unusual size, color or beauty, although at times one is collected that will rank with the best.

If we accept Mackinac Island with its peculiar limestone formation as being in the Lake Superior country, we note the occurrence of agates in three widely separated kinds of rock, the limestone at Mackinac and across the Straits toward the Soo, the strange conglomerate of Siskowit Bay and Conglomerate Bay, Isle Royale, and the various trap rocks or lavas composing the greater part of the outcrop all around Lake Superior and forming its great islands, Royale and Michipicoten, as well as the hundreds of smaller ones lying off its rocky shores. Many writers have mentioned localities and finds of agates, and thousands of tourists, miners and hunters have collected them from the beaches, and their prevalence was such that a little bay projecting into the Keweenaw Peninsula, was called Agate Bay, while Isle Royale has its Agate Beach at the southwestern end.

A number of the earlier explorers and travellers reported on localities

where they were observed, among them Schoolcraft¹, who was a member of General Cass's party in his travels through the Great Lakes and to the upper sources of the Mississippi River in 1820. At the portage where the Portage Lake Ship Canal now has its northern terminus in the present Houghton County, Michigan, he noted and admired "the variety of beautiful water-worn pebbles," and picked up a fragment of beautiful carnelian. "Radiated zeolite, crystallized quartz, chalcedony, prase, jasper, opal, agate and sardonyx, are also among the minerals picked up along this part of the shore." He further speaks of the very interesting character of the minerals at this place, also the rock where they were found in situ.

Charles Lanman² states that he was informed that the country around the present cities of Duluth, Minnesota, and Superior, Wisconsin, "abounded in . . . agates and carnelians of the first water."

Dr. Charles T. Jackson also reports agates from certain points on Isle Royale and Keweenaw Peninsula³ and Foster and Whitney⁴ in their "Report" say: "Of the varieties of quartz which occur in the south side of the lake, Superior, **agate** is by far the most abundant.

1 Schoolcraft, Henry R., *Narrative Journal of Travels From Detroit Northwest through the Great Chain of American Lakes to the Sources of the Mississippi River in the Year 1820* (Albany, 1821.), p. 165.

2 Lanman, Charles, *Adventures in the Wilds of North America*, edited by Charles Richard Weld, (2 vols. in one), London, 1854. Vol. 1, p. 50.

3 Jackson, Charles T., *Catalogue of Rocks, Minerals, Ores, Collected in the Years 1847 and 1848, Ninth Annual Rept. Smithsonian Ins.*, p. 338.

4 Foster, J. W., and Whitney, J. D., *Report of the Geology and Topography of a portion of the Lake Superior Land District, Part II*, p. 107.

It occurs in the cellular cavities of the amygdaloid, and especially in the outer band on the north side of Keweenaw Point, and along the Shores of Isle Royale. As this is gradually broken up and disintegrated by the action of the waves, the agates contained in it are accumulated on the beach. In general, the specimens found along the shore of the lake possess little value, except as souvenirs to those who have collected them, though occasionally an agate of considerable size and beauty is found. The finest of which we have any knowledge were found by Professor Mather, on one of the outer reefs of Michipicoten Island; some of the specimens were two feet in diameter. The agates occasionally pass into cacholong and carnelian."

Winchell in his first biennial report made to the Governor of Michigan in 1860⁵ says: "Some of the cherty nodules or pebbles at Mackinac, pass to the character of **chalcedony** and well marked **agate**."

Another fact of interest is that north and northeast of that point, toward the Soo, quantities of silicified fossils are found on the surface of fields, which are erroneously called agate, the replacement mineral having been silica instead of calcite. It is true, however, that occasionally a pseudomorph after coral or some mollusk is collected, a real agate, some of which are in my own collection. In these cases it would appear that the agate had formed in the cast of the original occupant.

Dr. Charles Rominger⁶ says: "North of the large conglomerate belt, which extends to the shore of Copper Harbor, Keweenaw Point, a belt of diabase full of agate nodules and delessite nodules projects in reefs in the harbor." . . .

In the first volume of "Mineral Resources of the United States," pre-

⁵ Winchell, Alexander, *First Biennial Report . . . Lower Peninsula*, p. 66, (Lansing, 1861.)

⁶ Rominger, Charles, *Geological Survey of Michigan, Upper Peninsula*, 188-4 Vol. V., Part I, p. 144, (Lansing, 1895.)

pared under the direction of Albert Williams, Jr., Chief of Division of Mining Statistics and Technology, (Washington, 1883), in the chapter on gems and precious stones by George F. Kunz, this statement occurs "Agate and chalcedony are found in a great many localities in America. Among them may be named Agate Bay, Lake Superior, where large numbers of small banded agates, usually of a red color, are found. These are quite extensively cut and are sold to tourists who visit Lake Superior." The same authority also says in the "Report on the Mineral Industries of the United States at the Eleventh Census: 1890," p. 673, (Washington, 1892), "At Agate Bay, Lake Superior, large numbers of small banded agates, often of a rich red color are found. Often these natural pebbles are polished all over, then drilled at one end, and sold to tourists as charms, or they are placed in bottles of water to show the markings to best advantage, neatly arranged as to color and size and sold as mementos."

There are other brief references to agates found in the Lake Superior country, but as far as I have observed, they are repetitions of the notices cited, or casual remarks by tourists, travellers or collectors, although it is likely that hidden away in the pages of newspapers there might be found some interesting material.

My own personal observations have been confined to Isle Royale, and very casually indeed, to Mackinac Island. At the last named place, I noted cherty nodules sometimes shading into a poor agate of no particular interest except from an archaeological standpoint, for they furnished fine material for arrow points to the aborigines.

During the summers of 1929 and 1930, I spent eleven weeks on Isle Royale making an archaeological survey for the University of Michigan. My work took me almost completely around the island, and much into the interior. As a consequence, my opportunities for collecting were fairly good, for it so happens that all

the most notable prehistoric locations are close to or moderately near the principal beaches where the different gems occur. In addition, my Sundays were frequently spent in searching the beaches when near them, or after the regular day's work was done through the week, and my collections were quite large.

There are two characteristic rock formations on the Isle where agates are found: the "Greenstone Ridge" extending from the tip of Blake Point at the northeast end of the Isle, to Washington Harbor at the southeast extremity. The term "greenstone" as here used, does not refer to the gem "greenstones," (chlorastrolites) but is a mining term for a lava rock. The second agate-producing formation is the conglomerate which gives a strangely wild effect to the scenery of Conglomerate Bay near the Old Light at Rock Harbor, and outcrops along the northerly shore of Siskowit Bay. Each of these formations produce agates so much differing in type that one who has made even a slight study of them will be able to select from a mixed collection, those from either kind of rock.

Most of those that I collected from the Greenstone, were secured in Tobin Harbor from Blake Point to Hart's Cove. The largest seen was firmly imbedded in the rock, and was about eight inches in diameter, and others in situ ranged in size from a hickory nut to six or seven inches in greatest dimensions.

Those that were free, were almost invariably flawed or broken, the finest specimen secured being a fragment only, a little over two inches long, and half as wide. It is exquisitely banded in the most delicate lines, white and pale and dark sard and carnelian, but badly flawed. These colors are typical of the Greenstone, in the masses of which, I also noted patches of bright red jasper. One nice cabinet specimen is a solid mass of white quartz crystals as large as one's fist, enclosed in a complete

shell of agate from an eighth to a quarter of an inch thick, the outside being a dark green. The largest found and now in my collection is irregular in form, five inches long, two-and-a-half inches wide and two inches thick. A fragment which had been broken off would have made the complete stone at least a half larger. It shows some fine banding, but is not a choice stone. Another broken agate is a pretty combination of color, light brown and white, with nice banding.

Three or four specimens have weathered somewhat, and there has been a "peeling" of the layers, a small one looking like the kernel of a nut with its husk removed; another of the "fortification" type, has scaled off in sharp angles: both might be used in demonstrations of the "growth" of agates.

I have mentioned Agate Beach at the southwest end of the Isle, but when I passed it on my last trip, my time was too limited to stop. I have been informed that some very fine agates have been collected there. This was about the only gem locality on the island excepting Chlorastrolite and Thomsonite Beaches, that had acquired even a local name. I would commend it to the visitor.

At the head of Siskowit Bay, a beautiful crescent-shaped beach stretches along the shore for about three-quarters of a mile, its northerly end terminates at the old county seat site where the conglomerate outcrops: From this point around the crescent southerly, the beach beyond the mouth of Caribou Creek is bouldery, with gravel, gradually fading out to sand as Senter Point is approached, for somewhere between the horns of the half-moon, the conglomerate and the sandstone which forms the rock-mass of the southwestern corner of the Isle, meet. In this gravel derived from the former, we find many fine, small agates, and so many beautiful carnelians that I felt justified in naming it Carnelian Beach, for it was previously nameless. Many of these carnelians are true agates, having

darker and lighter shades of that mineral in faintly contrasting layers, although many are clear, translucent gems of fine color, worthy to be compared with any wherever found. While some are rather opaque like the Asiatic stones, most of them cannot be excelled for purity and beauty. The finest one that I collected was about two inches long and proportionately wide and thick. Captain C. L. Sadler, of the U. S. Geological Survey, who was in charge of a party of topographers at that point on my last visit, so greatly admired this stone that I finally gave it to him in remembrance of a very pleasant acquaintance.

Many of the agates of Carnelian Beach are unique: not for size, but for oddity of pattern and beauty of color. There are several types; those in which a blood-red is a striking feature; others with a ground-mass of snow white with water-clear lines of formation; or with these reversed: some with solid masses of fine quartz crystals resembling ice enclosed in a thick shell of agate; amethystine agate and onyx, the ground-mass purple, with curved (agate) or parallel (sardonyx) bands of salmon-pink, white or reddish colors, as well as the carnelian-agate before mentioned. Another variety of gem of the agate family, is a surpassingly fine example of jasp-agate, an opaque stone having the fracture of jasper, but the

pattern of agate. My collection contains three cut gems of this type superior to any I have ever seen, and perhaps two or three uncut specimens⁷.

While the agates of Lake Superior are not of commercial importance, their variety, beauty and comparative abundance, make them of interest to the gem-lover and collector as well as the minerologist. The Great Lake with its majesty and mystery, its legends and history; its romance and tragedy; its wild scenery and contrasts of light and shade; the strange "tides" of its wonderful Isle; its lightnings and storms, its marvelous Sleeping Giant in calm repose, all add to the charm of the beautiful "flowers of the rocks" which THE GREAT MOTHER has so plentifully distributed with open hand, for our pleasure and our use; our instruction and uplifting.

⁷ Dustin, Fred. *The Gems of Isle Royale, Michigan*. PAP. MICH. ACAD. SCI., ART. and LETTERS, 16 (1931): 383-398, 1932.

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THE MINT CANYON AGATE BEDS IN CALIFORNIA

Agate locality near Robber's hideout of 1874

By J. W. PATTON

As a hobby, about seven years ago, I began the study of mineralogy and geology. I soon realized, however, that I must cut and polish stones if I wanted to get the full benefit of what I was studying, so I obtained some small machines and started to work on beach stones.

Needing some better material, I inquired among my friends and was told finally that there were agates near Vasquez Rocks in Mint Canyon. This canyon begins about forty miles north of Los Angeles, at Saugus, and extends north to Palmdale, on the edge of the Mojave Desert in California. From the mouth of the canyon, the first twelve miles is about a mile wide, between the San Gabriel Mountains and a line of hills known as the Sierra Pelona Range. This first twelve miles is mostly loose sedimentary material. Beyond this point we find signs of magmatic deposits.

At a point twelve miles north of Saugus, I found a dirt road leading to the right, into Tick Canyon. Following this road about five miles I came

to an old borax mine which is known as the "Sterling" mine. About twenty years ago it was rated as a good borax mine. Here I secured good specimens of Colemanite, Howlite, Ulexite (cotton balls) and some Chalcedony among which were some geodes, with quartz crystals, but these were not true agates.

Continuing east on the dirt road, about three miles, I came to Vasquez Rocks. These were great sections of bedded sandstone which have been tilted up at an angle of about forty-five degrees. They extend to a height of sixty or seventy feet and contain many caves and hiding places. They were used in early days as headquarters of a notorious bandit named Tiburcio Vasquez. He and his band of outlaws raided all up and down the California Coast.

Tiburcio Vasquez was born in Monterey, formerly the capitol of California. He was a very polite and gentlemanly bandit and was second only to Joaquin (pronounced Waukeen) Murrieta, another famous (or infamous) gentleman of the road. Both of them had very pronounced Robin Hood characteristics. Both were generous but both committed many robberies and murders.

Vasquez first appeared as a bandit in 1863, and carried on his nefarious business until 1874. He made many friends all over the state. These friends helped him to elude the sheriff many times. Finally he was trapped at a farmhouse in Hollywood. This territory was then farming land and cattle ranches. By the way, the famous film capitol of today does not look much like ranch land. Vasquez was taken north and was convicted of murder and was hanged the following year at San Jose. While



VASQUEZ ROCKS—view looking south

Vasquez was in jail at Los Angeles he had many visitors and his cell was filled with flowers sent by his admirers—mostly women. He was a very picturesque character, and boasted that he danced in every city in California.

The "rocks" which he used as headquarters for his band of outlaws were almost impregnable and made a good hiding place. This is not legend, it forms an interesting chapter of California history, and the "rocks" still carry the outlaw's name.

Here I found some amygdaloidal felsite scattered about, so I turned north on a dirt road and after traveling about two miles I found loose agates scattered on the surface of the ground. These were true agates with fortification lines and were very plentiful. Afterwards I made other trips to this section and found that the agate beds extended northward from Vasquez Rocks to the town of Acton, and from Mint Canyon road eastward to Soledad Canyon, a distance of about five miles north, and, at some points, three miles east. The agates have weathered out of what appears to be a series of intrusive magma ridges. These ridges have felsite rocks sticking up on their summits and are from one hundred to three hundred feet high. The sides are mostly long slopes, but in some cases they are steep walled gorges. The agates and geodes are found among the debris which has weathered out of the felsite.

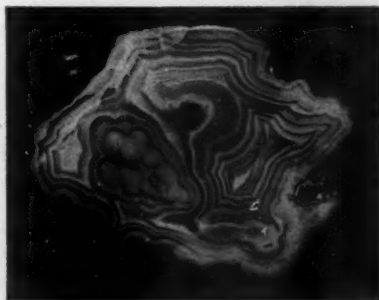
The agates vary in color from plain white to almost black. Some are light blue, also different shades of brown and yellow, and some contain green dendritic deposits. Here I also found several beautiful specimens of porcelain agate and some bloodstones. I also found several geodes containing amethyst crystals. Among other things I found good Calcite Crystals, Gypsum Crystals, Felspar, Cyanite and fine specimens of schist composed of talc and mica. The agates vary from the size of a pea to five inches in length, although the broken fragments indicate that there have been large geodes. The felsite is a reddish

brown. When we have heavy rains during the winter the agates are washed out from the debris. Some agates contain calcite crystals surrounded by chalcedony.

Many of the agates show breaks from settlement or from earthquake faulting. This evidently occurred while the agate was in a soft, jelly-like condition, as the breaks are always healed and as strong as the rest of the agate. In some of them one part of the agate is half the width of itself out of line. I have some agates with a flat side, and an examination of the deposit lines convinced me that the break had carried the other half away. These magma ridges were evidently very high at one time but have weathered down and formed sloping sides. Of course this may have been all one magma and the valleys become washed out by streams.

In the valleys where the banks are vertical the results of water cutting are evident and the agates are seen in their natural positions. A great number of agates are picked up and carried away each year. We have two large mineralogical associations here and several colleges and high-schools, which are teaching the young rock hounds to trail the minerals.

To continue on the Mint Canyon road from the point twelve miles north of Saugus where we turned east, ap-



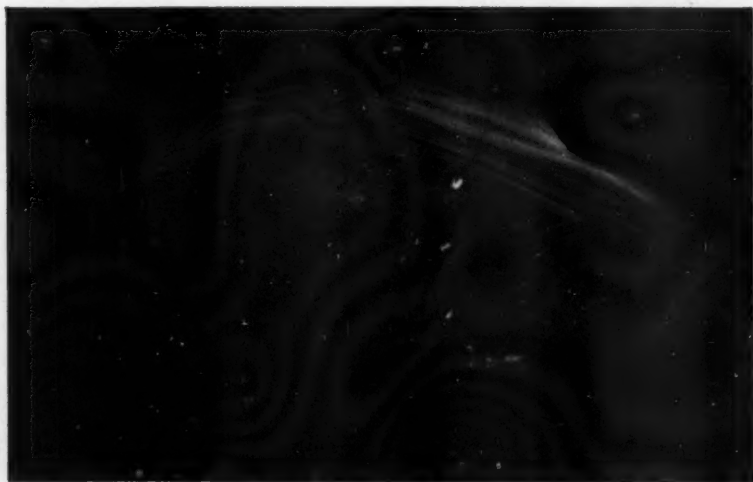
Note the banding in this polished Mint Canyon Agate.

proximately five miles further north there is a cross-road to the east with a sign reading "Vasquez Rocks." The Rocks are then three miles from here. Continuing north about five miles on Mint Canyon road, we came to the north entrance of Soledad Canyon at Acton which is practically the east boundary of the agate beds. So far as I can learn the agate beds were first called to public attention by the U. S. Geological Surveyors many years ago. I have paid about a dozen visits to these agate beds and have been in every part of them. The beds are easily reached as the Mint Canyon road makes a circle around the west and north sides of them.

Mint Canyon road is the main highway to Mojave with its newly discovered gold mines; and to the Owens Valley which is the source of the water supply for Los Angeles. The water is brought through this valley from the High Sierras by aqueduct, a distance of two hundred and fifty miles. The road is paved and comes

out onto the Mojave Desert at Palm-dale, about ten miles north of the town of Acton.

In the Soledad Canyon I found very few agates, but I did find an old copper mine, about one mile south of Acton and secured some copper specimens. Continuing south five miles I entered Bear Canyon in which I found beautiful specimens of dark Plagioclase Feldspar showing twinning lines about $1/32$ of an inch apart. Here also were many large boulders of mixed feldspar and ilmenite, some of them too large to lift. I found out afterward that there is a mountain of this ilmenite just east of this canyon. Many of the feldspar specimens contain iron pyrite. The walls of Bear Canyon are almost vertical and are composed of igneous rocks—mostly coarse granite, in which are dykes of feldspar and other minerals including Graphic granite. At some points the walls of Bear Canyon are not over ten feet apart and extend straight up two hundred feet or more,



A FINE SPECIMEN OF MINT CANYON AGATE (polished)

The floor of the canyon is covered almost all the year by a swift stream of cold water which dashes over huge boulders and makes passage here very difficult, but it is worth the trouble, both from a scenic and specimen standpoint. The Soledad Canyon also has a large stream of water. There is only one very small stream of water in the agate beds.

Just north of Bear Canyon in Soledad Canyon there is an abandoned Muscovite mica mine from which I secured splendid specimens six inches square. These I dug out of the vein which is from six inches to two feet thick. Continuing south of Soledad Canyon, and which from this point south is in the sedimentary deposits, I came back to Mint Canyon road.

Gold is washed in small quantities from the sand in all of the canyons I have named, but it is flour gold and hard to get.

The next canyon east of the Soledad Canyon is Placerita Canyon. This is where the first gold was found in California, and mined long before the great discovery at Sutter's Mill. I did not cover all this ground in one trip. It is just a nice round trip for a day's drive from Los Angeles and I often go there. It is about one hundred and twenty miles there and back.

There are still some wild animals here. I have seen deer, wildcats, skunks, rabbits and snakes. The agate beds are covered with low bushes, such as juniper, greasewood, cactus, etc., but very few trees. The Soledad Canyon is well wooded. This entire section is known as the Mint

Canyon Country and there are ranches scattered over it.

*Vasquez Rocks has been made into a picnic ground, and a great many people go there as it is a show place on account of its historical and scenic attractions, but very few of these people know that they are close to an agate bed, and they would not know an agate in the rough anyway.

About three miles south of Newhall there is a narrow pass known as Fremont Pass. This has been replaced by a tunnel known as Newhall Tunnel, but formerly the Fremont Pass was the only means of passage through the mountains. The pass is really an old water course, just wide enough for one vehicle to pass. It is very crooked and the walls are vertical and about one hundred feet high in igneous rock. At the southern end of the Pass is a monument bearing a plate in memory of General John C. Fremont who entered Southern California with his soldiers through this pass, to take Los Angeles from the Mexicans in 1847. A short distance south of the Fremont Pass, where Foothill Boulevard joins San Fernando Road, there is a beautiful fault which shows in the bank along side the road. It stands at about a forty-five degree angle, showing the breaks in the strata, and is plainly visible from both roads. The fault was probably caused by an upward movement of a section of the mountains. This fault should be viewed by all students of Geology in this section. Just north of this fault is one of the oldest oil fields in California and oil drips from the rock on both sides of the fault.

GILBERT HART -- *Geologist*

Examinations

::

Appraisals

CENTRE, ALABAMA

... AGATE ...

By Jonathan McCollum Blair

Historical

Known to Pliny.

Structure

Characterized by bandings and inclusions which give them a handsome rich appearance. Built of layers or bands, following courses,—some of them concentric, eccentric, waving or zig-zag, and others nearly straight and parallel, with delicate or broad bands. While the width of the bands is usually the same throughout the course, they are often extremely narrow. Some agates have 17,000/definitely marked bands to the inch. Usually found in rounded boulders having the appearance of being built up, layer on layer, by a master craftsman. The fine translucent agates graduate into coarse and opaque kinds.

Luster

Waxy, glass-like.

Color

Varying shades of white, red, yellow, bluish, pale and dark brown, gray, black, and all possible combinations of these colors. Green is mostly confined to moss agate.

Hardness

Slightly under 7.

Use

Besides its use as a semi-precious stone and as an ornamental material, agate is used industrially as follows: For mechanical bearings and supports, scale bearings in analytical balances, balls for water meters, mortars for laboratory use, spatulas, paper knives, playing marbles.

Trade

Birthstone for June. Also moonstone.

The gem-cutting industry in Oberstein dates back to 1497, and Oberstein, Idar and their outlying villages in Germany still furnish practically

all the cut agates used in commerce. Numerous cutting or grinding mills are situated on the local streams, and water power is used as a cheap method of turning the heavy sandstone grindstone used for cutting agates. The lack of water during the summer dry season used to seriously interfere with the output of the cut and polished agates. Drought has lost most of its terrors now, as there are many well-equipped lapidary shops in the district using gas or electric power.

Synthesis

Agates are often artificially colored black or deepened in color by boiling in honey or sugar-water and then in sulphuric acid. The color seldom penetrates far; so that even slightly chipping reveals whether an inferior agate has been taken and colored up, or whether the stone is natural.

Commercial Value

All agates are reasonably priced, varying from 50c to \$3.00 per stone, and from \$3.50 to \$150.00 for agate slabs and dishes.

Genesis

Formed in a cavity, the layers of different color representing deposition from water, carrying first silica with one impurity, then later, silica with another impurity. Gradually the cavity has been thus filled with silica; and when the mass is freed by the weathering away of the surrounding rock, these banded masses are found. Sometimes the manner of deposition has changed, and while the outer part of the cavity was filled with chalcedony, the central part will contain quartz crystals. The bands are the edges of layers of deposition. They derive their concentric waving courses from the irregularities of the walls of the cavity. As the solution is intermittently supplied, and the cavity does not contain enough of the solution at any one time to fill it until

the final injection, the solution passes through the outer layers by osmosis, the denser solution outside thus supplying silica as fast as it is deposited within.

It has always been more or less of a mystery to the layman as to how silica, an insoluble substance, gets into solution in nature. This is a good place for an explanation of this phenomenon or reaction. When we speak of the insolubility of substances, silica and silicon rocks is thought of. For what can be more insoluble than rock. The mountains have lasted since time immemorial, insofar as human, and not geologic, history goes, and these mountains are made of rocks, siliceous mostly. To be soluble, anything when put into a liquid disappears from our sight, and the liquid remains liquid. If we put a piece of sugar into water it disappears, and the water remains water, and we say that sugar is soluble in water. But when we put silica, as a piece of rock crystal, in water it remains solid and does not pass into the water, so we say that silica or rock crystal is insoluble in water. But let us pulverize the rock crystal very finely; then we find that some of it disappears on adding water. We pour off the water and add some more. More silica is dissolved, and so on until we can dissolve all of it. This may seem strange to the ordinary observer, but it is a fact, nevertheless. Silica when finely pulverized is soluble in water.

All spring water is not pure, but contains, among other things, some silica. Let us understand how this takes place. Ordinary water can be evaporated at all temperature above 32 deg. F. That is, as soon as it begins to be water it also begins to evaporate. Now when water evaporates on contact with air, it unites with one of the constituents of the air, nitrogen, and forms ammonia, and when that ammonia dissolves in water, as it can very readily, it forms an alkaline solution; and when it comes into contact with silica, which it does when falling as rain, it dissolves the silica, forming a sili-

cate. So rain always has ammonia in it, and snow, which is rain in a finely divided state, is very strong of ammonia. This is the way that silica is taken up by the rain when falling, and is carried to the plants to form their skeletons. So silica, when present in plant life, is present as colloid silica, onyx. So in animals. Silica is always present as onyx in organic life.

There is another point in regard to genesis in general which is not generally taken into account nor very readily perceptible, except through the examination of hundreds or even thousands of similar specimens. Certain of these specimens will give the clue to certain processes of formation, or show the oftentimes closely connected relationship or relativity between varieties which are usually considered quite distinct and remote from each other. Such types are known as genetic specimens, to use the proper meaning of the appellation. For instance, I have a topographic agate from Paka, Bohemia, which simulates by transmitted light a topographic map. The inclusions show distinctly that the specimen is related to moss agate and to cloudy agate. The edge is irregular and covered with silicified bark. In reality it is a complete cross-section of agatized wood. Yet it is also quite as distinctly a topographic agate, a moss agate, or a cloudy agate. These are merely transition phases relative to one another, and no clear mark of demarcation exists between many varieties of many minerals, when viewed in the light of select genetic specimens. This is not only true of agate, but of nearly every mineral, gem, rock, or fossil. Evolution is as much a factor in the inorganic as in the organic realm.

The layers of agate differ in porosity, and therefore in the rate at which they are etched by hydrofluoric acid; consequently the etching process brings out the different layers and makes engravings that will print exact pictures of the agate.

Foreign Localities

Surinam. (Dutch Guiana).

Achates river, Scilly. Agates were named after this river, which is the original and ancient source.

Italy. Brown and gray.

Japan. Pale red and white banded.

Schlottwitz, Saxony. Bright red, remarkably brecciated.

Oberstein, Nahe dist., Birkenfeld principality, Oldenburg, Rhenish Prussia, Germany. One of the most important localities for agate until the discoveries of large deposits in South America in 1830. The local agates are now practically exhausted. They were very dark and rich looking. Commonly combinations of deep reds with dark grays. Fortunate is the collector who possesses genuine Oberstein agates. Some of them were pictorial, with human portraits and natural frames. One such in the possession of the author depicts the head of a blond girl. Natural flesh and hair colors, with a natural oval frame with drab-red border. Best seen, like an oil painting, from a little distance. About 2x3 inches.—Many agates labeled Oberstein are from other sources, having been labeled Oberstein because cut and polished there. An Oberstein agate, however, has peculiarities of its own which enables the expert to segregate it from others in a collection.

Idar. Nahe dist. (Cf. Oberstein).

Paka, Bohemia. topographic agates. By transmitted light simulates a topographic map, showing contour lines, forests, lakes, etc.

Serra do Mar Mountains. Prov. of S. Paulo, Brazil. Parellel-banded and cloudy agates, morion onyx, sardonyx, carnelian-onyx, red agate. This material is often artificially colored dark blue, which with the banding, displays beautiful shades of cabalt blue by transmitted light, simulating stained glass of a cathedral window.

Prov. of Rio Grande do Sul, Brazil. oriental agate. Transparant to translucent with beautiful variegated, concentric and stellate markings.

U. S. Localities

Natural Bridge, Jefferson Co., N. Y. Of moderate beauty.

N. W. shore of Lake Superior. Abundant and beautiful.

Agate Bay, Lake Superior, Mich. White clouded with light brown, brown banded, gray mottled with red.

About the Willamette river, Oreg. Of moderate beauty.

About the Columbia river, Oreg. Of moderate beauty.

Johannesburg, Calif. Pale blue, parell-el-banded. Also opal-agate, snow-white interspersed with translucent grayish fine bands.

Varieties

1. Blood agate. Pink, flesh red, salmon.
2. Bull's-eye onyx.
3. Carnelian onyx.
4. Cloudy agate.
5. Eye agate.
6. Fortification agate.
7. Jasper agate. Chalcedony banded with jasper, or jasper patterned with chalcedony.
8. Leopard agate.
9. Mocha agate.
10. Moss agate.
11. Onyx.
12. Oriental agate. Finely marked and very translucent agate.
13. Opal agate. Banded opal with alternate layers of opal and chalcedony.
14. Pictorial agate.
15. Rainbow agate. Shows iridescence when cut across the concentric structure.
16. Riband agate. Broad ribbon-like parallel stripes. A red alternating with green type from Siberia is unusually striking.
17. Ring agate. Differently colored bands arranged in concentric circles. Not to be confused with eye agate, which is concentric but not circular, has no great variegation of color, and has a dark center.
18. Ruin agate.
19. Sardonyx.
20. Scenic agate.
21. Topographic agate.
22. Wax agate. Yellow agate with a pronounced waxy luster.

23. Wood agate. Agatised wood.

Eye Agate

Concentric rings with a dark center, simulating a human eye.

Bull's-eye onyx

Single white ring on a black ground, with a black center. A local science teacher made the statement that a perfect circle is not found in nature. If your judgment is not narrow, too precise and microscopic, the bull's-eye onyx will afford a practical refutation of the specious statement of the science teacher. The author has a beautiful specimen from the Serro do Mar. locality in Brazil.

Cloudy Agate

Agates with a concretionary formation, i. e., they are one concrete mass—and, when cut in a thin section and polished, give a beautiful cumulus cloud effect by transmitted light, and often with reflected light alone.

Fortification Agate**Structure**

Shows the angular character of the ground plan of a fortress, traced in parallel zig-zag lines.

Color

Light to dark brown. Often shows curious markings. Extremely interesting when polished.

Ruin Agate**Structure**

Brecciated, faulted, or otherwise modified fortification agate, depicting an aerial view of a ruin.

Color

Light to dark brown shades.

Moss Agate (Indian agate)**Color**

Displays green hair or fibre-like tracings, occasionally star-like radiations. Often colored red, occasionally yellow. Human silhouettes are sometimes noted in Brazilian stones.

Foreign Localities

China. Gray with green inclusions.

India. Predominantly rich green. Also gray with red and brown inclu-

sions, cloudy gray with brown inclusions, gray with black inclusions.

Japan. Gray.

Brazil. Predominantly green, occasionally mottled red, yellow, and green.

U. S. Localities

Kansas. Cloudy gray with brown inclusions.

Glendive, Dawson Co., Montana. Cloudy gray with dark brown inclusions, cloudy gray with red-brown and dark brown inclusions.

Wyoming. The moss agate pebbles range in size from 2 inches or more in diameter and are usually well rounded. Good specimens are uncommon. Associated with pebbles of red and black jasper, quartzite, milky quartz, chalcedony. The moss agates range from opaque white and gray to highly translucent gray with dark brown, reddish- to yellow-brown, and black dendritic markings. Dark brown and black markings are the most common. They show great variation in size and delicacy of pattern. Some are small rounded tufts, too dense to show individual lines, and others are as much as 2-3mm. across, exhibiting very delicate moss-like or sea-weed-like markings. The original source of the gravel was the White River formation of the vicinity, of Oligocene age.

Fremont Co., Wyo. Scattered over the surface of the ground in several townships.

Along the Sweetwater Valley, Wyo. Fort Bridger, Uinta Co., Wyo.

Yellowstone National Park, Wyo. near Cheyenne, Wyo.

Casper, Wyo. Leopard agate. Uniformly distributed black stellate inclusions in translucent gray ground; the precious equivalent of the more common leopardite (Charlotte, N. C.), and probably a transition phase of leopardite.

Mocha Agate. (tree agate, dendritic agate)**Color**

Whitish or gray, covered with red, brown, or black dendritic figures produced by manganese and iron

oxides, simulating trees, plants, shrubbery, etc. Just one of Nature's pictures. Steel can't scratch it and acid cannot remove it.

Trade

Makes very effective brooches.

Synthesis

Artificial mocha agates have been produced in Germany by etching figures on chalcedony. These stones have been so perfectly etched as to deceive many collectors, but the expert can usually detect them.

Foreign Localities

Vicinity of Mocha, Arabia. Original source.

India.

U. S. Localities

Western states. Many fine stones.

Scenic Agate

Depicts landscapes.

Onyx

There is a great deal of misunderstanding and confusion in regard to the term onyx, some mineralogies describing it one way and some another. This confusion results from a false premise, viz., that onyx is a definite variety of agate, whereas it is more a broad structural term and includes several sub-species. Furthermore, it is a trade name with quite an extensive signification, not confined to agate alone. In an endeavor to better understand the problem, let us take some strictly mineralogical descriptions and compare them with the artisan and tradesman's conception.

Structure

Wide parallel bands or layers (not so broad as in riband agate), of usually two alternating colors; occasionally 3 or more alternating colors.

Varieties

Agate onyx. Variegated parallel bands.

Carnelian onyx. White banded with red carnelian.

Morion onyx. Black banded with white.

Sardonyx. White or black banded with brown sard.

—Such descriptions are reversible. For instance, in carnelian onyx, red with narrow bands of white would still be carnelian onyx.

—Now let us go into the trade and get the rest of the idea, Onyx is used for fine duo-tone cameos and intagli. The stones selected for engraving in cameo are generally called onyxes, consisting of two layers of different colors forming a strong contrast, as the black and white layers of morion onyx or the red and white layers of carnelian onyx. The design is almost always engraved exclusively in the white layer, and the dark-colored layer forms the background, the contrast of the two colors serving to render the design more distinct. Occasionally onyx stones having three or more layers of colors are employed for cameos.

As mentioned before, those artists who work in precious stones attach a much more extended signification to the name onyx than do the mineralogists, who ought to modify their nomenclature in regard to onyx, and, for that matter, to a great many more meaningless and confusing names. The aim of the mineralogist should be to describe and differentiate as many varieties and sub-species of varieties as possible, but NOT to give them confusing or inappropriate names.

All the stones in different colored layers employed for cameos are known to the practical man by the general name of onyxes.

Onyx is, namely: a layered stone, occurring in any of the semi-transparent or opaque varieties; thus there is the onyx of the sard, called sard-onyx; that of the carnelian, called carnelian onyx; the onyx of the shell, called shell onyx; the variegated onyx of the agate, called agate-onyx; the onyx of the precious opal, called opal onyx; and so on through the whole variety of stones used as onyx.

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SOME NEW MEXICO AGATES

Many fine agates found on surface of small hill

By G. B. ELLERMEIER

It seems to be a way of minerals, especially cutting material usable by the amateur lapidary, to hide in some out-of-the-way place not readily accessible to the motorist. However, this patch of New Mexico agate apparently intended for the convenience of the hurrying traveler. About forty-eight miles west from Los Lunas on U. S. Highway 66 are two towns, Laguna, and two miles farther west, New Laguna. We are not interested in New Laguna; the place is mentioned merely to obviate any uncertainty as to the particular town which is to serve as a landmark.

Eastward from Laguna (often locally spoken of as "Old" Laguna) the aforementioned highway runs approximately east and west. About two miles east of Laguna, and on the north side of the road there is a cone-shaped hill that affords considerable agate of fair cutting quality. The hill may readily be identified as follows: About a half mile south of the road there stands atop a high, bare hill an airplane signal tower, plainly visible from the highway. Directly opposite said tower, but north of the road and distant about a quarter mile from the road, is the agate hill, a trap rock formation well forested with low trees—pine trees, if memory serves correctly.

The agates, mostly in good size fragments, lie scattered among the trees from the west base of the hill all the way to the summit, a distance

of nearly four hundred yards. Whether or not agates are to be found on other sides of the hill, or on nearby hills, I made no effort to determine.

The unbroken agates consist of rather rough, angular nodules, ranging in size from about an inch and a half up to four inches, the outside being coated with a thin layer of opaque white chalcedony. Within the color ranges from a bluish-gray chalcedony through a light pink to a fair carnelian and a deep brownish-red sard. The light colored stones are very translucent in thin slices while the deeper colored material is more nearly opaque.

In less than an hour I picked up about fifteen pounds of agate fragments, selecting only pieces that displayed pleasing color. Since I had a fair load of specimen and cutting material previously gathered in Arizona, it did not seem advisable to increase the load overly much by taking whole agates that when later slit open, might or might not display quality. However, one whole agate was taken along. It was about three inches in diameter, and when slit open the diamond saw disclosed within the white coating a bluish-gray chalcedony richly splashed with patches and clouds of brilliant red.

This trip was made in May, 1935, and an amateur lapidary at Gallup told me about the agates to be found on that hill. Undoubtedly conditions there have remained unchanged to the present time.

POLKA-DOT AGATE IN OREGON

Described by the discoverer of Tridescent Obsidian

By P. L. FORBES, Bend, Oregon

The collection and study of agates and other minerals is doubtless the oldest vocation known to man. As the caveman roamed over the countryside, he would pick up various pebbles and other bright objects that appeared colored or curious. That the early caveman did collect mineralogical material is well known, as remains and fragments of his specimens are found today in his early dwelling. Doubtless they were first brought in as curious objects to be passed around for inspection, but uses were soon found for this material. In this way, man learned to use minerals and agates for tools and weapons as well as ornaments.

Agates, jasper and other members of the quartz family can be found in good quality in every county in Oregon, but one of the oddest and most beautiful is found at Pony Butte, in Jefferson County, Central Oregon. The material is locally known as Polka-Dot agate. It is an unusual type of chalcedony. This material occurs in a large variety of colors, much of it being pure white in color with circular markings scattered throughout. These circles or dots vary in size up to about 1/4 inch and are of many colors, making attractive contrasts in color and pattern. The snow-white material with bright red or black dots is especially attractive when polished, as well as for specimens. A few dots have been found with another dot inside, making it look like an eye. The nature of these colored dots have not yet been determined. Some have advanced the theory that the dots were hot-like pellets, dropped in the chalcedony before becoming hard. One of the oddest things about this material is that it was all mined out by the Indians years before the white man found it. This was all done by fire and water. A lot of wood was piled

against the cliff, and after being set on fire, was covered over with dirt, similar to a charcoal pit. This was done to hold the heat against the rock. In time, when the fire was exhausted, the dirt was moved back and acted as a small dam to hold the water which was thrown against the rock, thus causing it to check and break. This has been proved by the writer by taking a large piece and heating and throwing water on it and it would break into pieces, the same size as now found. The largest workings are about 20 feet down from the top of a 100 foot deep canyon, where the Indians have made a room about 15 feet deep and 7 feet high. (1) A few of the brown dots contain iron and do not polish as readily as the black, red or other colors. (2) The Polka-dot and other material was all thrown down the steep slope except the opal chalcedony which they wanted for arrow points. This opal chalcedony is next to obsidian for chipping and is a little tougher and stronger, thus making fine points, drills, etc. The writer has been able to find hammers, dulling stones, and other tools used for arrow point making, at most all the workings. Also there were found a few points, partly made, which were given to Mussupeta-na (Up-River Boy) an aged Indian arrow point maker, who finished them for me into very fine points. My Indian friend says the Polka-dot material was discarded because it was too dry to chip well. Although he made a few points from it, they were harder to make and did not possess the sharp, keen cutting edge they wanted for points. It seems as if 95% of the people have the opinion that points were made by fire and water, but no point was ever finished that way. However, some of the raw material was mined out by fire and water because they had no other

means to mine it. They would use elk horns for crowbars and wedges to get the material loose after being checked. This information the writer obtained from Mus-su-peta-na.

Most people do not believe the Indians were intelligent enough to mine. The first settlers say the mines are now just as they first were found except that tons of the discarded chalcedony has been taken away in recent years by lapidarists and mineral collectors, and last summer, a man put off a powder charge to secure more. No doubt the Indian workings will all be destroyed and forgotten by the white man in future years.

Most people have the impression that the Indians were cruel, barbarious and worthless people, but when one learns and knows more of them, they will find the opposite. Most of them were honest, kind, law-abiding with a lot of character and more respect for virtue than the paleface. Their laws were few but well kept. Although they seemed slow in action they were very expert and quick with their bow and arrow. One of their games or contests was to see who could shoot the most arrows at some distant mark before the first one hit. Mus-sey-peu-ua-fich (meaning a man from the Up-River Country and shrewd like a coyote, as the Karok and most tribes thought the Indian and coyote the best medicine—or in other words the smartest) could sometimes have as many as eight arrows in the air before the first one struck or landed in the marked out area. The opal chalcedony was always used for this kind of shooting as it was less apt to break than obsidian when hitting the marked spot. There is a place near an old camp site at Thorn Lake, Lake Co., Oregon where this contest has been held, it being an ideal spot. They shoot about one hundred and fifty yards across an open dry river bed into a soft clay hill

that had no stones in it. Every year the erosion of the soil uncovers hundreds of points. The writer has found over one thousand points there himself.

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AGATES IN THE CANAL ZONE

By P. A. FREEHAN

When the Panama Canal was under construction, vast quantities of minerals, in boulder and pebble form, were dug up by the huge steam shovels and thrown out on the waste dumps. Many tons were also dumped into the two oceans, Atlantic and Pacific.

I have been an employee of the U. S. Government for many years (22 in the Canal Zone) and being interested in minerals, since 1893, gathered up some of the discarded minerals and had many of them cut and polished. The majority of specimens found were of quartz, chiefly agates, many of which were of excellent quality. Most of the specimens found varied in size from very small to about the size of a man's head. Occasionally, a few larger ones were found.

It may not generally be understood that Panama, which also includes the Canal Zone, is a volcanic country, in fact one of the old craters at Volcan is 1497 feet high. No one has as yet been able to climb to the top of this crater and look down into its extinct pit. At Boquette, the town is built within an extinct crater, one side of which blew out 8,000 years ago (scientists' figures). At Volcan the flow of lava appears as if it had but recently flowed down the mountain side. I have never been fortunate enough to meet any of the "great" geologists visiting the Isthmus but from what I have heard I am inclined to think that not one ever had much to say about the origin of the minerals found there. My honest opinion is that most of the minerals have been deposited during the Glacial Period because they all occur in boulder or pebble form and no ledge has been definitely located.

Fossils of marine life are abundant, especially on high altitudes, which prove conclusively that volcanic upheavals have had undersea sources.

Minerals occur both in the Canal Zone and Panama, but due to the

fact that in excavating for the Canal huge quantities of minerals have been uncovered, mineral specimens are naturally more common in the Canal Zone. In the sections undisturbed, one may occasionally find a few specimens. Good fields for search are along stream beds during the dry season (December to April). But the best fields are the large waste banks along the Canal which contain the material dredged out; the best localities are towards the Pacific Ocean near Balboa, Corozol, and Ancon. The Chagres River valley afforded at one time some nice specimens but that section has now been entirely flooded.

The specimens which I have found embrace the following:

Agates. The most beautiful and most numerous of all were the agates. Moss agates especially intrigued me as when cut and polished they made beautiful settings for rings, pins, and other jewelry. One valuable specimen had a perfect outline of the Isthmus of Panama and even showed several small islands, the Pearl Islands in the Pacific Ocean, 14 miles south of Panama. This specimen, cut and polished, was presented to the Canal Zone Museum at Balboa Heights, Canal Zone.

The moss agates are translucent quartz with dark green mossy inclusions. A few specimens were rose tinted and one was red tinted.

Banded agates, fortification agates, bull's eye agates and other types were common and beautiful and though not so highly colored nevertheless made beautiful settings when cut and polished. Blue agates were occasionally found; a few good ones are in my collection. A specimen of white agate, presented to the Crane Museum in Pittsfield, Mass., shows indentations of calcite crystals which have long since dissolved out and disappeared. I have also a beauti-

ful specimen of carnelian agate; the red layers resemble dried blood.

As mentioned above, Panama is a volcanic country and many minerals show the effect of having passed through intense heat. I have specimens of agates which show indications of having melted and run like wax down the side of a lighted candle; others have the appearance of having been shattered into innumerable pieces and then fusing together again. The outside of many others appear burnt and look alike while their inner parts are of entirely different characteristics.

Amethyst. Sometimes found in crystal form in geodes.

Bloodstone. Found occasionally but not of good quality. I have heard that one man claimed to have found a ledge of this mineral but the specimens shown me were of poor quality. This was the only ledge for minerals I ever heard of on the Isthmus.

Carnelian. Fairly common and at times good specimens are found. See Agate.

Chalcedony. Very common and of good quality.

Geodes. These are also found but very few perfect ones. The shell or outer crust is made up of layers of various colors of agate while the interior is filled with irregular quartz crystals. Occasionally one finds amethyst crystals in the geode but they are of little value for cutting. The outer shell is sometimes used for ornamental cuttings.

Jasper. These are very common and there is no limit to colors or tints. They take a beautiful polish and make excellent mountings. I have one mounted that shows very plainly a woodland scene.

Petrified Coral. Also common and take a beautiful polish. Some valuable specimens of sea shells (petrified) have been found which scientists claim have centuries ago ceased to exist.

Petrified Wood. Very common and very beautiful. Some evidently are

millions of years old as several types show species that have long since been extinct. I have some very rare specimens of coconut, black and white palm woods—all show the grain and structure of each variety which has different color and char-

Rock Crystal. Common in geodes but generally are of poor quality.

Gold. Gold is also found in Panama but so far mining for it has not been a paying proposition. Gold appears to be plentiful in some localities but being found in clay it is all but impossible to wash it out. In the process of washing, the clay becomes more and more sticky. Several companies have been formed to mine the properties but they soon gave them up as non-paying propositions.

Leucityte. This occurs as a mass of leucite crystals and takes a very fine polish. I find that very few manuals describe this beautiful stone; it is not over plentiful.

I have spent many pleasant days collecting specimens during my leisure time which exercise has been of material benefit to my health. Twenty-two years in the death-dealing climate of the Canal Zone without a day lost on account of sickness, proves that hunting minerals must be a help to health as well as instructive.

My collection is limited because it is not convenient to carry many specimens in my travelling. But I always can collect more. Thousands of specimens are still available on the dumps and elsewhere. Being a retired employee of the U. S. Government in the Canal Zone and having all the privileges and rights of an employee, I am a booster for the Zone and usually spend my winters there—in the now best climate in the world.

Editor's Note: Panama has an area of 32,358 sq. miles and with a population of 472,468. The Canal Zone has an area of 549 sq. miles and a population of 39,467. The Canal is 50.4 miles long.

SWEETWATER RIVER MOSS AGATES

Present Agate locality once Indian hunting Ground

By G. B. ELLERMEIER

During the fore part of September, 1935, Mr. Charles Sivey and the writer set out upon a trip through Wyoming in search of moss agates. While we knew from hearsay of several regions where agates of that variety were reported to have been found, we did considerable prospecting along the way. Though we did find agates, of sorts, in many parts of the state, none were of the moss variety and few were of use to us as amateur lapidaries until we arrived at the herein later described bed in the Sweetwater River region. To be sure, there is an old locality about twenty miles southwest of Douglas known as Moss Agate Hill. Though that twenty miles must be traveled over a none too good dirt road, still the place has been sufficiently accessible to render the bed practically cleaned out and hardly worth the effort of a trip.

Eventually we worked our way to Split Rock, which is shown on the road map as a town situated on U. S. Highway 287 about eleven miles northwest of Muddy Gap. Actually, the "town" consists of a ranch and a few buildings located on a dirt road a half mile north of Highway 287. The place takes its name from a cleft mountain peak which is a famous landmark. The agate bed lay, we knew, in the vicinity of Sage Hen Creek, considerable distance north and west of Split Rock and on the opposite, or north, side of the Sweetwater River. Here Highway 287 runs roughly parallel to the Sweetwater and some two or three miles farther south. Our problem was to locate a road that would lead to a crossing place of the river and in the direction of the agate bed. Ranch houses in this section are few and far apart, and nobody seemed to be home that day, but finally we contacted a homesteader who described a road about eight miles west of Split Rock that would serve our purpose. He was

also able to give some vague information as to how we might reach the agate bed after negotiating the river.

Later we were not surprised at the vagueness of his directions, and the best advice that we can offer anyone who may contemplate a trip in there is to go to Split Rock and make inquiry in that vicinity. An attempt upon the part of the writer to give more specific directions in print would likely lead only to confusion. The beds are well known in that locality and lie about eighteen miles northwest of Split Rock, as we were obliged to make the trip, and perhaps ten miles north of the river. Much of the way the road dwindles into a mere track that continually branches into trails that eventually end somewhere out in the sage covered flats.

It may have been due to mere luck, or possibly to an instinct for following the right trail; anyway, after crossing a broad mesa we came to the rim where the table-land broke sharply off to drop into a deep, wide gulch. We could go no farther. The sun's red rim was just touching the western horizon; this mesa did not have the appearance of an agate bed, and much less was it inviting as a camp site. The ground was covered with a growth of low sage that would not afford sufficient fuel to boil a pot of coffee. Our glances met. One made the suggestion that we look about while there remained some twilight and then pitch camp for the night. So we piled out of the car and, within a few steps, each picked up a small moss agate pebble. Needless to say that camp-making was deferred until we could no longer distinguish an agate from any other pebble.

Throughout the next two days we scoured that locality, each obtaining about one hundred fifty fair stones

and one-third that number of really good agates. The agate bed proved to be over a mile in length and nearly as broad as long. Along the rim where the mesa broke off to dip into the gulch, the agates were most numerous, far larger, but of much poorer quality than those found out among the sage on the level mesa. Probably for each stone retained as desirable, we picked up and discarded a score or more.

Some agates are quite black and wholly opaque. A few are brown and opaque; many of the larger stones are gray in color, opaque and badly fractured. It pays to select with care, as few of the above mentioned agates are worth carrying away; Whereas the desirable stones are small, smooth, nearly oval pebbles, more or less smoky in color, and translucent when held toward the light so that the moss-like markings may readily be seen. The markings vary from minute, thickly strewn flecks up to bits of moss the size of a tack head. Some markings are beautifully arborescent, much like spreading fronds. In size the opaque stones may attain a diameter of three inches, while the desirable translucent stones generally run from a half inch up to an inch and a half. Many are of a convenient size to cut into one ring set. The agates have the appearance of water-worn pebbles, though doubtless they lie where long ago they weathered out of the parent rock. The lifting power of frosts and the shifting of sands by winds will continue to expose agates at the surface of the ground for a long time to come.

Though neither of us is an ardent collector of artifacts, still each had the luck to pick up on that agate bed a spear head chipped from hornstone.

At some past day that mesa must have been a great buffalo range and Indian hunting ground.

Fire opal is also reported to have been found in that general locality, but though we broadened our search to cover a wide area no opal of any kind was discovered. Nor did we find agates on the far side of the gulch.

If one contemplates going into that locality one should carry a supply of water and be prepared to remain there a day or longer. Night trips in or out are not advisable.

For the agate hunter, here is a precaution to bear in mind: Many people know agate but are unable to differentiate between worthless agate and the usable kinds. To them any agate is apt to mean moss agate. They may tell you how to reach a locality where considerable "moss agate" may be obtained, and their desire to serve may be sincere, but the information may lead to an arduous, unprofitable trip. On several occasions that has been the writer's experience both in Colorado and in Wyoming.

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NORMAN, ARKANSAS

THE AGATES AND JASPER OF THE ATLANTIC COASTAL PLAIN

By Dr. Titus Ulke

It is an interesting fact that some very fine specimens of agate and jasper have been found in the gravels and drift of the Coastal Plain, and particularly in the vicinity of Washington, D. C.; Baltimore, Maryland; and northeastern New Jersey.

Before some of these occurrences are described it may be well to consider the distinguishing characteristics of agate and jasper, and their relation to other varieties of quartz.

Agates are alternately banded aggregates of chalcedony and jasper, amethyst or other varieties of quartz, commonly found as rounded floats, their structure indicating their usual origin as due to deposition in cavities in amygdaloidal, porphyritic or spherulitic rocks. Geodes are often formed in this way.

According to the particular color and structural patterns present, we may distinguish ruin agates, clouded agates, banded agates, coral agates, spotted agates and moss and landscape agates. Occasionally the banding appears in coarse or fine, straight parallel layers, instead of, as usual, in concentric rings. The color of the different bands may be of almost any tint from white to black or yellow, gray, green, red, brown, blue, or amethyst, and a band may even be colorless or transparent.

Beautiful and unusual agates are often found in gem collections that have been artificially colored by means of acids, honey, oil or other chemicals, and sometimes so deceptively that only an expert can detect their artificial nature.

Chalcedony was long considered to be the embodiment of **amorphous** silicic acid, while quartz embodied **crystallized** silicic acid. Now, as opal consists essentially of amorphous silicic acid, usually combined with

from 3 to 13% of water, so chalcedony and its numerous varieties, all once considered to be essentially intimate, though indefinite, mixtures of amorphous and crystalline silicic acid, such as onyx, petrified wood in part, carnelian, sardonyx, plasma, heliotrope, chrysoprase, moss agate, and even chert and flint, were placed in a mineral group intermediate between quartz and opal. In all of them the supposedly amorphous silicic acid constituent could be extracted by potash lye (KHO).

Subsequently it was demonstrated by Heinrich Rose and Rammelsberg that the lye-soluble constituent was largely cryptocrystalline and not, as supposed, amorphous silica, and that its solubility increased with the density of the mineral examined. Tests made with dilute hydro-fluoric acid also proved that chalcedony and agate were merely intimate mixtures of a more easily and a more difficultly soluble SiO_2 .

For these and other reasons, chalcedony and its above mentioned varieties, together with agate and flint, are no longer considered as being definite mineral species, but as varieties only of the mineral quartz.

Jasper is normally a dense form of minutely granular or crypto-crystalline quartz, colored red, yellow, green or brown by iron oxide or hydrate, possessing conchoidal fracture and a dull luster except on polished surfaces. We may distinguish the following varieties: common and variegated jasper, globular or ball jasper, orbicular jasper (Kinradite), banded or ribbon jasper, and agate jasper.

Beautiful ornaments, as well as useful utensils, such as mortars, fancy boxes, table tops and vases, are manufactured from agates or jasper.

Agate Occurrences: Fine moss agates have been collected near Bare Hills, northeast of Baltimore City, Maryland.

A remarkable red and gray banded agate, with a carbonate core, all inclosed in a basaltic matrix, from Pluckamin, New Jersey, is in the U. S. National Museum collection.

A rounded mass of milk white and light blue banded agate from West Paterson, New Jersey, as well as a fine agate with very narrow, close set bluish white bands, from Great Notch, New Jersey, may also be seen in the U. S. Museum.

Recently a rounded pebble about 2 inches long was picked up by Scott Graham from a gravel deposit at the junction of Sligo Creek and Northwest Branch, Maryland, and cut and polished at the U. S. National Museum. It proved to be a fine agate, with curved banding, milk white, bluish white, gray and brown in color, resembling those found in Brazil and Uruguay.

Occurrences of Jasper: Among the gravels of Northwest Branch, near the Chillum Road Airport, the writer discovered a dark red, water-worn pebble, 3 by 4 inches long, which he had cut and polished by the expert polisher, Mr. Reberholt, of the Museum staff. The stone proved to be a fine, variegated jasper, showing a blood-red ground mass, irregularly intersected by veinlets of lemon-yellow quartz.

A large jasper pebble, uniformly brownish red in color, and 5 by 10 inches in size, found in drift in the District of Columbia, is on exhibition in the D. C. Collection of the U. S. National Museum. Mrs. James Benn picked up a red jasper float, about 1-1/2 inches, in diameter, with a vein of white quartz running through it, on Good Hope Hill, D. C.

In the Museum collection may also be seen a large mass of brown jasper from Washington County, Georgia, and a specimen of evenly colored dark yellow jasper obtained from Rileyville, Virginia.

One can often recognize that a rounded float is liable to be agate or jasper by noting its pitted, etched, or roughened surface, and by its dull yellow reddish-brown color.

No doubt many fine specimens other than those listed could be obtained by a careful search made among the drift or loose gravel boulders found in the Atlantic Coastal Plain.

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HOW AGATES FORM IN NATURE

Institute for Precious Stone Research — Idar, Germany

By GEORGE O. WILD

Up to several decades ago, it had been the general belief that agates were formed by silicic acid circulating within the lithosphere depositing layer after layer of chalcedony into cavities of certain amygdaloidal rocks. It seemed easy to thus explain the fine banding which most agates show and inasmuch as certain developments of the bands appeared to be influx channels the theory was accepted and hardly ever questioned or even critically considered. The rhythm exhibited by the bands was easily explained by ever changing conditions of the neighborhood, possibly by geysers, by the change of the seasons and many other causes which seemed probable.

While it should not be entirely disputed that these causes might in some way influence the filling up of amygdaloidal cavities or later change the consistence of the material or chemical processes within such cavities, it seems to be perfectly impossible to thus explain the nicety of the agate bandings, its at times perfectly round shape, the double rhythms and a certain fine structure between the bands. It was therefore a great step forward when Dr. R. E. Liesegang, the well-known German exponent of colloid chemistry, showed that exterior influences are unnecessary to perform a psuedo-stratification such as is shown by agate. He was able to prove, and everyone can easily duplicate his experiments, that the rhythms of certain chemical processes come from within, provided they take place in gelatinous mediae. The precipitated silicic acid is a proper gel-like or sponge-like substance in which diffusion of dissolved molecules can take place with a certain deference just as in liquids. When one places sulphate of copper on the bottom of

a jar, one will notice that within a few days the blue solution rises and tends to mount to the top, spreading itself through water which fills the jar. Equally a solution of bichromate of potassium will diffundate into a 5% hardened solution of gelatine in water. After a while the gelatine will be completely soaked with bichromate.

If we take an aqueous solution of bichromate and mix it with a solution of nitrate of silver we would get a deep red precipitate of chromate of silver which would probably exhaust the water from all dissolved bichromate of potassium. It is well to make this experiment and follow what happens. One will notice that the precipitation will not take place immediately but only after a second or two. What happened? The moment the chemical reaction took place there existed an oversaturated solution of chromate of silver which took a second or two to form a "seed" or "germ" molecule. As soon as this molecule was built all others fell into line and the precipitate was there.

To show this process one might make a saturated solution of acetate of sodium at, say 80 degrees centigrade. At room temperature a saturated solution will be formed by half the amount acetate used, and whatever is over will not dissolve. Leaving the heated solution alone, one will notice that in cooling down to 20 degrees C., none of the salt will drop out or crystallize. However, immediately upon touching the solution with a minute crystal of acetate or any substance having the same crystal habit, all the over dissolved acetate will drop and leave the solution with the content of the one which we have made at room temperature. The solution was "metastable", super-

saturated, as was the solution of chromate of silver. Only after a "seed" formed somewhere by either some grain of dust as a "catalyzer" or by reaching a top point of oversaturation, the red mass formed in heavy clouds.

Now let us follow what might happen to our bichromate gelatine when an aqueous solution of silver nitrate is poured on top of it. The silver will slowly enter the gelatine forming at first a super-saturated solution, which will drop its contents at some place near the surface of the gelatine. A red layer will form. In forming, all molecules of chromate of silver, which have done away with bichromate of potassium molecules as far as the silver penetrated, will flow towards this layer and to a distance of say 2 to 3 millimeters there will be very little silver and very little potassium. The silver keeps on penetrating the gel, winds its way through the layer of red chromate of silver, finds nothing to react with immediately after and keeps on moving. It will arrive where the unweakened gelatine still offers bichromate to react with and will again form a super-saturated solution and the play of forces will repeat the process, form a new band, weaken the next gelatine section and keep on doing this until all the silver is exhausted. The more bands are

formed the longer the single action will require and the further apart the bands will be.

It is instructive to make this test within test tubes and on photographic plates on which the gelatine containing the bichromate can be spread. A drop of silver nitrate in the center will develop the most wonderful banded ring systems and other figures and mostly all phenomena which the agates show can be explained by the theory which Dr. Liesegang forwarded, based on the rhythmical diffusion phenomenon which bears his name in chemistry, physics, biology, medicine, even in dentistry, and many other branches of science.

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EARLY AMERICAN AGATE LOCALITIES

Extracts from "A Catalogue of American Minerals with their Localities."

By SAMUEL ROBINSON, M. D., Boston (1825)

MASSACHUSETTS

CHESTER:—Agate, one specimen in the sand, near Chester Village, weighed upwards of 180 pounds, consisting of yellow jasper, and chalcedony. A much larger mass partly agatized was near the meetinghouse. (p.41).

DEERFIELD:—Agate, in greenstone, 1 mile east from the Academy. A new locality of them of very fine specimens, including the fortification agate, striped or ribbon agate, eyed agates, and chalcedony; one weighed 23 lbs. (p. 47).

MIDDLEFIELD:—Agate, not very abundant. (p. 60).

SOUTHAMPTON:—Agate, on which are quartz crystals (p. 71).

DALTON:—Agates, very large, in masses of hornstone and jaspery quartz, and jasper (p. 284).

RHODE ISLAND

BRISTOL:—Agate, coarse, consisting of red jasper and quartz and **Shale**, in rolled masses, with vegetable impressions; abundant on the southeast shore of the same island (p. 79).

CUMBERLAND:—Agate, on Diamond hill, some fine specimens have been found (p. 82).

CONNECTICUT

BERLIN:—Agates, and quartz crystals in the valley of a brook, west of the m.h. (p. 92).

EAST HAVEN:—Agate, either loose or imbedded in secondary greenstone, with chalcedony. These agates, either oval or conical, usually consist of bands of chalcedony and quartz, variously striped, or spotted or interlaced with Jasper, Carnelian, and Cacholong. In the same rock occur **Geodes of Quartz**, lined with

small crystals of quartz, transparent or amethystine or smoky, or yellow, and sometimes spotted or tipped with red jasper (p. 95).

SOUTHBURY:—Agate, in nodules composed of layers of blue and white chalcedony, which layers are principally incrustations of a solid nucleus of quartz, and are often quite handsome. (p. 110).

Agatized wood: It is principally hornstone; its cavities are lined with minute quartz crystals and layers of chalcedony, three miles south west from Smith's Inn: abundant (p. 110).

WATERTOWN:—Agate, beautiful specimens (p. 112).

WOODBURY:—Agate, in secondary greenstone (p. 113).

NEW YORK

BROOKLYN:—Agate, on East River, abundant. (p. 117).

CANAJOHARIE:—Agate, in large coarse masses (p.119).

FLORIDA:—Agates, large masses of coarse (p.127).

LAKE GEORGE:—Agate (p. 129).

SARATOGA SPRINGS:—Chalcedony, lining the cavities, which are very numerous, of a kind of amygdaloidal rock. It more frequently forms geodes, the insides of which are usually studded with small, brilliant crystals of quartz. The walls of these geodes frequently pass into

AGATE, in various places, but its best locality is 80 to 100 rods west from the Congress spring. (p. 149).

MICHIGAN

LAKE SUPERIOR:—Chalcedony, imbedded in amygdaloid, in globular masses, from the size of an ounce ball to that of a hen's

egg. Also very plentifully along the shore, more or less abraded.

Agate, with the preceding, imbedded or detached. They are all onyx agates, consisting of parallel stripes of variously colored chalcedony, jasper, hornstone or quartz, in size from small nodules to a 32 lb. shot. (p. 241).

NORTH WEST TERRITORY

PRAIRIE DU CHIEN:—Carnelians, and agates; very well characterized, on the alluvial banks of the Mississippi, at Prairie du Chien (p. 242).

ILLINOIS

DES PLAINES:—Agatized Wood. A petrified tree was found in the bed of the river Des Plaines, about 40 rods above its junction with the Kankakee, imbedded in a horizontal position in a stratum of newer floetz sandstone, of a grey color, and close grain. There is 51½ feet of the trunk visible, 18 inches in diameter at its smallest end and probably 3 feet at the other end (p. 244).

MISSOURI

Opalized Wood, and Agatized Wood, are found dispersed along the shores of the Mississippi; the 2 last are also found along the shores of the Missouri (p. 246).

ESTABLISHMENT CREEK:—Hornstone, 8 miles from St. Genevieve, on the soil with chalcedony and

Agate, whose colors are arranged in Concentric lines. (p. 248).

ST. GENEVIEVE CO.:—Opalized Wood, small pieces in the form of a parallelogram, accompanied by the common Agatized Wood, of the Missouri, by yellow quartz and by chalcedony, are distributed very plentifully along the shores of the Mississippi, between St. Genevieve and St. Louis (p. 252).

ST. LOUIS:—Agatized Wood, near, on the banks of the Missouri and Mississippi. (p. 253).

ARKANSAS

WHITE RIVER:—Agate, on the highland S. of White River, and about

300 miles west of the Mississippi (p. 260).

NEW JERSEY

PAQUANACK MOUNTAIN:—Agate, from the size of a pin's head to 3 lb. Sometimes the eyed and fortified agates. (p. 168).

PATTERSON:—Agate, near, in greenstone, and in most of the greenstone hills of the state (p. 169).

PINE BARRENS:—Agatized Wood. It is susceptible of a good polish (p. 169).

PAULUS HOOK:—Agate, a rolled mass was found near. (p. 170).

PRINCETON:—Agatized Wood, specimens of **recently** petrified wood are sometimes met, lying on the surface. (p. 170).

DELAWARE

CAPE HENLOPEN:—Agatized Wood, near. (p. 194).

MARYLAND

ANNE ARUNDEL CO.:—Agatized Wood (p. 195).

BALTIMORE:—Agate, near (p. 196).

DISTRICT OF COLUMBIA

Agatized Wood, Woodstone, 3 miles north from Washington, sometimes invested with minute crystals of quartz, fine specimens and abundant. (p. 202).

VIRGINIA

GREENBRIER CO.:—Agate (p. 204).

NORTH CAROLINA

LINCOLN CO.:—Jasper, red and yellow, and Agate, are found in the vicinity of the limestone, throughout its whole extent. (p. 215).

STOKES CO.:—Agate (p. 218).

FLORIDA

TAMPA BAY:—Hornstone, flint, agate and chalcedony occur in the southern part of the secondary district. (p. 303).

GEORGIA

AGATE, in a matrix of limestone, approaching chalk. (p. 222).

BRIAR'S CREEK:—Agate, 2 or 3 miles from the road leading from Savannah to Augusta, forming a solid mass across Briar's Creek, which passes through Milhaven, and empties into the Savannah,

on which is built a mill dam. Below the dam, in cutting the raceway, numerous hollow balls were found, filled with a milky fluid. (p. 223).

TENNESSEE

NASHVILLE:—Agatized, petrifications, siliceous and calcareous, many of them are found also upon the highest lands, on the plantation of Mr. Craighead. (p. 227).

INDIANA

Chalcedony and agate, are often found in the bed of rivulets. (p. 237).

LEATHER WOOD CREEK:—Agates, on the bottom of the Creek, in geodes, sometimes of great beauty. (p. 238).

CANADA

NOVA SCOTIA

PARTRIDGE ISLAND:—Agate, in greenstone, usually forming geodes. (p. 262).

LOWER CANADA

GASPE DISTRICT:—Fortification Agate, in pebbles on the seashore. (p. 263).

UPPER CANADA

LAKE HURON:—Fortification Agate, imbedded in rolled masses of amygdaloid. (p. 269).

LAKE SUPERIOR:—Fortification Agate in the porphyry, and plentiful, large and fine, in the amygdaloid. (p. 271).

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HOW AGATES WERE DISCOVERED IN URUGUAY

A collection of agate specimens, in the rough, is on exhibition in the department of geology at Field Museum of Natural History, Chicago. This material was collected by a Marshall Field expedition to South America, and it comes from a region, remote and difficult to access, in the north of Uruguay, whence most of the world's supply of agate is received.

Agates were first discovered in Uruguay about 1860 under strange circumstances, according to Henry W. Nichols, curator of geology, who picked up the story while in South America on the museum expedition. A German boy from Oldenburg, center of the European agate industry, had

been fighting in the Brazilian army. When the war or revolution was over, the foreign soldiers were no longer wanted in the Brazilian army, and were removed in the most informal manner. This boy was conducted across the border into Uruguay and told not to come back. Wandering through the Catalan district of Uruguay he noticed agates in the stream beds. As he had been reared in an agate-working community he recognized the value of the material and wrote about it to an uncle in Germany. His uncle came to Uruguay and established the industry in that country on a scale larger than it existed anywhere else.

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AGATES ALONG THE ATLANTIC COAST

By Peter Zodac,

Editor Rocks and Minerals

Agates are rather rare in the East and in general do not compare in quality and beauty with those found around Lake Superior or out in the West. Nevertheless interesting and oftentimes very beautiful specimens are occasionally found but these in general are small and come from the basalt quarries.

Agates have been found in practically every state along the Atlantic Ocean, also in Nova Scotia and New Brunswick, Canada. Furthermore they were known to occur in these states over 100 years ago as Robinson¹ recorded many localities. Although in some instances only one or two specimens may have been found at a locality while a few other localities may have long since become exhausted, agates may still be found if searched for diligently. No doubt there are a number of localities which have never been recorded and if readers knowing of such localities would write them up for ROCKS and MINERALS or at least submit a list of them, the writer would be most grateful. We further hope that this article may induce collectors residing in the states listed to "watch out for agates." Good agates always make valuable additions to collections.

The list of localities mentioned below may not by any means be a complete one and the writer would appreciate notices of omissions.

Nova Scotia, Canada

Many beautiful agates are found in the trap rock (basalt) outcrops of Nova Scotia and though localities are numerous some are almost inaccessible. A few localities are dangerous to reach because they occur along the shores of Minas Basin where high tides are frequent and of great height.

¹ Robinson, Samuel, *A Catalogue of American Minerals with their Localities*. Boston, 1825. (See *Early American Agate Localities* in this issue).

The cliffs are almost vertical and often form small coves at their base; to be caught in such a cove with the water rising means almost sure death. It is impossible to row against the tide which varies from about 26 to as high as 62 feet.

Cape D'Or, Partridge Island, and Two Islands in Cumberland County; Amethyst Cove at foot of Cape Blomidon, and Scott's Bay in Kings County; and Digby Neck, Sandy Cove in Digby County are some important localities for agate. A moss agate is also found on Two Islands, in Kings County.

New Brunswick, Canada

Dana² records two localities for this Province, as follows:— Dalhousie, Restigouche County and Tabique River, Victoria County.

Maine

The only locality known to the writer is that reported by J. D. Dana³ as Perry (Gin Cove).

New Hampshire

No localities known to the writer.

Massachusetts

Aside from Chester, Dalton, Deerfield, Middlefield, and Southampton mentioned by Robinson, at least one new locality may be added — the Lane trap rock quarries near Westfield. The two nearest the city are huge workings, still in operation, and were personally examined by the writer. The agate occurs here as small banded masses in the basalt, and are of rare occurrence.

² Dana, Edward Salisbury, *The System of Mineralogy of James Dwight Dana 1837 - 1867*. New York, 6th Edition, 1920, pp. 1103, 1104.

³ Dana, James D. *Manual of Mineralogy*. New Haven, 1870, p. 375.

Rand⁴ stated that agates were frequently seen in Deerfield, at Cheap-side, south of the river.

Rhode Island

Diamond Hill in Cumberland used to be a celebrated locality for quartz minerals and though agates were quite common they were not of very good quality. This locality was recorded by Robinson and also that of Bristol.

Connecticut

Robinson recorded Berlin, East Haven, Southbury, Watertown and Woodbury as localities for agates.

Dana⁵ reports agate as occurring at Farmington and at New Britain.

Schrader, Stone and Sanford⁶ report agate at Farmington (Hartford Co.), at East Haven (New Haven Co.), and at Woodbury (Litchfield Co.); that specimens from the last locality have been cut for seal stones. They also report that agate is found in different localities in amygdules in trap.

At the New York State Museum, Albany, N. Y., three nice polished agates from Connecticut are on display. One is about 3x5, grayish, and comes from Durham. Another is partly banded about 3x2 and comes from Guilford. The third is a jaspery agate, reddish, about 2x3, and also comes from Guilford.

Small banded agates have been found in the trap rock on the western outskirts of Meriden.

New York

Robinson recorded 5 localities for agate as follows: Brooklyn, Canajoharie, Florida, Lake George and Saratoga Springs.

Mather⁷ stated: "In the town of Ramapo, Rockland Co., near the southern extremity of the western

hook of this trap range (basalt), traces of copper ore were observed in the trap by the roadside between Ladentown and the outlet of the valley of the Ramapo river, on Smith's clove, from the Highland Mountains.——

A single nodule of most beautiful agate was found among the debris of the trap ridge, at the above locality. It was coated with red oxide of copper."

Dana⁸ lists agate as occurring at Palatine, Montgomery Co.

Manchester⁹ lists agate as one of the many minerals found in New York City.

At the New York State Museum, Albany, N. Y., are two agate specimens worthy of mention. One consists of grayish blue nodules in calcite from Saratoga and may come from the same locality as that listed by Robinson. The other is a small grayish mass incrusting dolomite and is from the Prison Quarry, Ossining.

Robert Taylor of Peekskill, N. Y., found a fine little moss agate pebble at Camp Smith, near Peekskill, which he presented to the writer. It is ½x1 inches, pale greenish gray with black markings. The specimen was found Aug. 7, 1933 on the 200 Yard Range.

New Jersey

The best agates in the East are found in New Jersey. Localities are numerous and likewise are the agates but good specimens are not common. The most important occurrences are the trap rock (basalt) quarries in and around Paterson. Very fine banded red and gray agates are frequently encountered which even in their rough state are beautiful but when polished they make excellent specimens for a cabinet.

Robinson recorded 3 localities: Paquamack Mountain, Patterson, and Paulus Hook.

8 Dana, E. S., *System. Work* cited, p. 1031.

9 Manchester, James G., *The Minerals of New York City and Its Environs*. New York, 1931, p. 84.

4 Rand, J. C., *Minerals of Massachusetts. THE MINERAL COLLECTOR*, April 1898, p. 29.

5 Dana, E. S., *System. Work* cited, pp. 1060, 1061.

6 Schrader, Frank C., Stone, Ralph W., and Sanford, Samuel, *Useful Minerals of the United States*. Bull. 624, U. S. Geological Survey, Washington, 1917, p. 97.

7 Mather, William W., *Geology of New York, Part 1*. Albany, 1843, p. 282.

Cleaveland¹⁰ reported: "Near Paterson, in greenstone, and in most of the greenstone hills of that State. They are zoned, generally in nodules, often in geodes, lined with minute crystals of quartz. The outer zone of the agate is sometimes light blue while the interior is nearly white, and embraces a globular, reddish brown nucleus." Patterson is now Paterson and the greenstone is no doubt the basalt.

Manchester¹¹ lists many localities for agate, as follows:—Bergen Hill (Hudson Co.); Bound Brook (Somerset Co.); Great Notch, in trap (Passaic Co.); Hopewell, in trap (Mercer Co.); Liberty Corner (Somerset Co.); Little Falls, in trap (Passaic Co.); Millington, in trap (Morris Co.); The Oranges, in trap (Essex Co.); Paterson in trap (Passaic Co.); Plainfield, in trap (Union Co.); Princeton (Mercer Co.); Snake Hill, in trap (Hudson Co.); Summit, in trap (Union Co.); and Upper Montclair, in trap (Essex Co.).

See also: "The Agates and Jaspers of the Atlantic Coastal Plain" by Dr. Titus Ulke in this issue.

Some of the important quarries noted for agates are as follows:

Braen's Quarry.

This is a huge basalt quarry about 400x800 feet in area with vertical walls about 100 feet high and is on top of the mountain to the west of Hawthorne. The quarry is operated by Samuel Braen & Sons. Many nice agates are found here but are not of a quality as that from Prospect Park about a mile to the south and on the same range. The agates occur chiefly in a decomposed brownish basalt as small to large masses and nodules. The agates are vari-colored, bluish and gray, red and gray being the most prolific.

Mr. Edward Wirtz, Scoutmaster of Hawthorne, advised the writer that during the week of Aug. 10, 1936, he found a large black and white banded agate nodule that weighed about

20 lbs. He also found at the quarry a number of blue agates that were of fair quality.

A small nodule of moss agate about an inch long was picked up at the face of the quarry, Oct. 1935, by Edward Allison of Philadelphia, Pa. The moss was grayish-brown and the matrix light purple in color. It is a very handsome specimen and was polished by the New Jersey Mineral Exchange of Paterson, N. J.

Consolidated Quarry

At the Consolidated quarry, Upper Montclair, a peculiar type of agate is found. The agate is a combination of a dark brownish-red chalcedony (resembling carnelian) and smoky quartz. Sometimes the chalcedony is elliptical in form with the smoky quartz in its center; one such specimen embedded in basalt was 2¼ inches long and 1¼ inches wide with the chalcedony forming a band ½ inch wide around the included quartz. Other times the chalcedony forms irregular masses in the basalt with the smoky quartz following it in shape. When polished they make rather odd specimens but not so very attractive. Now and then the chalcedony will be found spotted with red dots.

Nice red and bluish striped agates also occur here but they are not so good as those of Braen's or the Prospect Park quarries. One nice little specimen formed the base for a xled amethyst and was of fair quality.

Francisco Quarry

Finely banded agates have been found in the Francisco trap rock quarry (now abandoned) in Great Notch. One beautiful specimen, 2½x3½ is illustrated in the accompanying plate. It is to be regretted that the quarry is no longer in operation so that more of these nice agates may be found.

New Street Quarry

The New Street trap rock quarry in Paterson (also known as West Paterson) is world famous for its long array of excellent mineral specimens. It is still in operation (by the Paterson

¹⁰ Cleaveland, Parker, *An Elementary Treatise on Mineralogy and Geology*. Boston, 1822, p.

¹¹ Manchester. Work cited, pp. 65, 67, 75, 77, 79, 81, 85, 86, 87, 88, 91, 94, 95.

Crushed Stone Co.) and consists of two quarries—the Upper and the Lower. The Upper quarry is east of New Street and is no longer in operation. The Lower quarry is west of New Street and is actively worked. A distance of about 300 feet separate the two quarries.

At the Upper quarry, good agates were fairly common in days gone by. They were nicely banded—some were flattened. Specimens now are no longer obtainable as the quarry was shut down many years ago and there is no dump.

At the Lower quarry, fair specimens of agate were uncovered around 1933 but none have been since, so Mr. Robert Mercer, the Superintendent, advised the writer on a recent visit to the locality.

A specimen from the Lower quarry is in the writer's collection. It is a

rather unique specimen for an agate. In some ways it resembles a horse's hoof that has been somewhat flattened; in another way it resembles a clam shell. The agate is banded red and grayish-blue and is slightly translucent. It had parted nicely along one of the bands and the two sections fit so perfectly that in front the parting cannot be detected. A good name for this type of specimen would be "shell agate."

Very fine pink, gray, and white agates have been found at the New Street quarries and have been cut for gems. Manchester illustrates three cabochons in his excellent book.

Prospect Park Quarry

At the Prospect Park trap rock quarry (also known as the Sowerbutt Quarry), near Paterson, the writer collected a number of fine specimens of agate. The mineral appears to be



COURTESY JAMES G. MANCHESTER

A beautiful agate (actual size) from Francisco Trap Rock Quarry, Great Notch, New Jersey.

This very fine illustration is Plate 18 in Manchester's "Minerals of New York City and Its Environs". The book contains 128 plates.

common as during the trip of Nov. 9, 1935, at least one dozen good specimens were collected. In general the agate is a banded bluish chalcedony, often with reddish bands, but sometimes almost gray in color and specimens are most attractive when embedded in basalt. Agate appears commonly in a rough geodic form up to 3 inches in diameter. It is also found in the form of narrow bands as the contact between basalt and chalcedony, amethyst, rock crystals or smoky quartz. Although agates are generally banded with red lines, these lines at times disappear and in their place red dots are scattered through the mineral. On Nov. 9, 1935, a fine specimen of agate pseudomorph after anhydrite, was collected by the writer.

The finest specimens of Eastern agates seen by the writer come from this quarry. One excellent specimen was presented him by Mr. Wm. Casperson of the New Jersey Mineral Exchange, Paterson, N. J., who in this way wished to assist the writer in the preparation of this article. The agate is finely banded, white, gray bluish and red in color, polished and is of the type known as "fortification agate." An interesting feature seen on its polished face is a minute vein of smoky quartz which runs near one edge of the specimen. This vein is later than the agate because it cuts cleanly through the bandings and even faulted then slightly. At one extremity of this vein, it terminates in a small, slightly translucent mass of smoky quartz which is in sharp contrast to the main mass of the agate which is practically opaque and densely massive; the vein therefore was pushed out from this mass of smoky quartz. The other extremity of the vein could not be seen as the agate is there coated by diabantite. A fragment of an anhydrite cast is attached to one end of the specimen.

Spottiswoode & Cusack Quarry

At the abandoned Spottiswoode-Cusack trap rock quarry on Walker Road, in Orange, Reamer¹² found 17

¹² Reamer, Louis, *Agate Found in an Old Abandoned Quarry*. ROCKS and MINERALS, Dec. 1929, Vol. 4, No. 4, p. 109.

nice specimens of blue-banded agate. The find was unique in that the quarry was not known for minerals. Furthermore the discovery was by mere accident when a wasp's nest was disturbed in the floor of the quarry. Something attracted his attention and he investigated it, regardless of the angry pests buzzing around, when to his amazement and delight agate was found around the nest. The find was made in 1926.

Delaware

No agates are known to the writer as occurring in Delaware.

Maryland

Robinson records agate as occurring near Baltimore, but during the intervening years it has been found at other localities. See "The Agates and Jaspers of the Atlantic Coastal Plain," by Dr. Titus Ulke, in this issue.

Virginia

Reported by Robinson as occurring in Greenbrier, Lincoln and Stokes Counties. No definite localities are known to the writer.

North Carolina

Dana¹³ records Sassafras Fork, Granville Co. and Snow Creek, Stokes Co. as localities for agates.

Kunz¹⁴ states that fine agates and chalcedony are found in Caldwell, Mecklenburg Co.; near Harrisburg, & Concord, Cabarrus Co.; Granville, Orange Co.; and moss agate near Hillsborough Orange Co.

See Robinson's list; also South Carolina.

South Carolina

Linneman¹⁵ reports that he had noticed agates as water worn pebbles on beaches along the Atlantic Ocean in North and South Carolina. The pebbles were fairly common, grayish to brownish in color and banded—but were not of good quality.

Georgia

Robinson recorded Briar's Creek.

¹³ Dana. *System. Work* cited, pp. 1076, 1079.

¹⁴ Kunz, George F., *History of Gems Found in North Carolina*. Bull. 12, North Carolina Geol. & Econ. Survey, Raleigh, 1907, p. 35.

¹⁵ Linneman, Joseph. Personal communication.

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Schrader, Stone and Sanford¹⁶ report it from Fulton and Jones Counties.

Mitchell¹⁷ states: "Agate or rather banded jasper and chalcedony has been found in the cherts of northwest Georgia. The ground of the State Fish Hatchery at Summerville, contains a considerable quantity of this material. The beautiful banded quartz often termed agate has been found in Wilmot's Ravine near Thomaston. Actually this material is crystalline. Agates and jaspers have been reported from several other localities within the State and our gem display in the State Museum contains a few polished specimens of these stones."

See Robinson's list.

Florida

Grayish agate, slightly banded and

¹⁶ Schrader, Stone, Sanford. Work cited, p. 107.

¹⁷ Mitchell, Lane. Private communication.

associated with chalcedony (pseudo-morph after coral) has long been known to occur in Tampa Bay. Robinson listed the mineral from this locality over 100 years ago. The mineral and especially the chalcedony is frequently uncovered during dredging operations.

The grateful thanks of the writer is extended to Mr. Robert Mercer, Superintendent of the New Street Quarry; to Mr. Peter Vandermade, Superintendent of the Prospect Park Quarry; Mr. Wm. Casperson, Manager of the New Jersey Mineral Exchange; to Mr. Lane Mitchell, Assistant State Geologist of Georgia; to Mr. Joseph Linneman of Buffalo, N. Y.; and to Mr. Edward Wirtz of Hawthorne, N. J. for valuable information on agate occurrence which was incorporated in this article.



SPOTTISWOODE-CUSACK TRAP ROCK QUARRY, ORANGE, N. J.

A quarry supposedly barren of minerals yielded, by accident, some very fine agates.

MOSS AGATE

Institute for Precious Stone Research — Idar, Germany

By GEORGE O. WILD

Moss agate is one of the most interesting varieties of agate. The green mossy inclusions at times intermixed with red makes it extremely attractive as a material for all kinds of artistic objects as well as for jewelry.

Up to about 60 years ago, it had been the belief that the branchlike growths which moss agate encloses were of organic origin; it was thought that real moss had been petrified. Extensive examination, however, revealed that the ashy residues of moss agates, after being heated to a high temperature, were magnetic, so that it became probable that some iron hydroxide constituted the inclusions. This view was fortified by the fact that a red color appeared, due to oxidation, where the oxygen of the air had a chance to penetrate through cracks, fissures, and other open channels or porous parts. There the green would turn into the typical red known to be due to iron pigmentation.

It was not until Gergens and Liesegang forwarded their views on these growths that the old theory was discarded. They showed that the "moss" had been formed by the action of iron salts in the liquid and semi-liquid phase and they were able to produce identical forms, colors, and reactions in identical surroundings. It is interesting to follow their experiments which may be copied by anyone with the most simple means.

While the now hard agate was in the making it was in liquid or gelatinous form. That kind which formed the moss agate was very probably some type of a waterglass containing sodium, potassium or calcium. By interaction with sulphates of iron or any other acid salts, such water-glasses could produce the moss-like branches seen in moss agates; experiments in the laboratory have demonstrated this and at times imitate to the most minute details the

appearance of moss agate. There remains very little doubt that similar reactions had taken place in nature. The experiment, however, does not arrive at the hard stage of the agate but can only create the growths which are embedded in a semi-hard silicic acid which in time would harden.

For our experiment we need only a few grains of iron sulphate, some dilute waterglass, and a glass vessel, preferably a test tube. Drop the iron sulphate into the solution and watch what happens. After a few minutes a green branch grows out of the green iron salt and it soon rises to the top of the liquid. It either grows in the shape of a thin tube or pipe or will assume a form that looks like algae in water; even certain cell-like structures form so that the artificial growth looks plant-like.

What happens? The sulphate of iron dissolves and immediately reacts with the waterglass, which is sodium silicate. Silicic acid is formed which is non-soluble and which forms a bag around the sulphate holding also the insoluble iron hydroxide of green color. Within this bag the sulphate of iron dissolves further and water enters through the pores of the silica bag by endosmosis. The pressure inside the bag rises and soon becomes high; it inflates the bag and whatever dissolved sulphate it contains rises to the top of the liquid within. Finally the pressure bursts the bag open and the sulphate solution comes into contact with the new waterglass. Immediately a new skin is formed, appearing like a plant cell; new sulphate rises from below and soon another burst brings it into contact with the sodium silicate. This repeats itself as long as there is a supply of iron from below. The specific lighter iron sulphate solution aids the growing upwards. According to the denseness of the waterglass, the

(Continued on Page 196)

AGATE GLOSSARY

By PETER ZODAC, Editor Rocks and Minerals

Introduction

The large number of terms used for the various types, bandings, and coloring of agates have little or no significance on the mineral itself. For the most part these terms give a descriptive name to each particular specimen having certain characteristics or peculiarities.

Acknowledgments

In the compilation of this glossary, the writer has drawn freely from Gilbert Hart's *Compilation of Gem Names*. Other sources were the works of Parker Cleaveland, Edward Salisbury Dana, Harry Emanuel, Julius Wodiska, and J. McC. Blair.

- Agate**—A variegated chalcedony whose colors are either banded, irregularly clouded or due to visible impurities as in moss agate. Chalcedony is a variety of quartz.
- Agate Jasper**—Variety of quartz intermediate between agate and jasper, with predominant translucent chalcedony.
- Agate Opal**—Opal with bands of different colors.
- Agate Onyx**—Onyx with variegated parallel bands.
- Agatized Wood**—Wood petrified by cloudy agate which usually retains the structure of wood.
- Aleppo Stone**—Eye agate.
- Amberine**—Agate, yellowish green, from Death Valley, Calif.
- Amber Agate**—Same as Amberine.
- Banded Agate**—Banded chalcedony. The colors are in wide bands and follow outline of cavity in which the agate was formed.
- Blood Agate**—Pink and salmon or flesh-red banded chalcedony from Utah.
- Brecciated Agate**—Fragments of variously colored chalcedony cemented by chalcedony.
- Carnelian Agate**—Agate with bands of red carnelian.
- Carnelian Onyx**—Agate with alternating bands of white chalcedony and red carnelian.
- Cer-Agate**—Agate, chrome yellow from Brazil.
- Chalcedony Onyx**—Agate with white and pale bands.
- Chalcedony**—Agate with alternating strips of gray and white.
- Clouded Agate**—Agate with colors irregularly clouded.
- Cloudy Agate**—Same as clouded agate.
- Coral Agate**—Coral replaced by silica (quartz).
- Cyclops**—Eye agate with a single eye.
- Dendritic Agate**—Moss agate.
- Dotted Agate**—Agate, when many colors appear in dots or points.
- Eye Agate**—Agate, concentric rings with a dark center; (2) thomsonite.
- Eye Stone**—Agate, concentric bands with center more highly colored than rest of stone; (2) thomsonite.
- False Lapis**—Agate or jasper artificially stained blue.
- Fancy Agate**—Agate, one showing delicate markings and intricate patterns.
- Figured Agate**—Agate, when the colors appear in irregular figures, bearing more or less of resemblance to clouds, stars, landscapes, etc.
- Fire Agate**—Gold stone, an artificial product.
- Fortification Agate**—Agate, with parallel thin zig-zag lines resembling the outlines of a fort.
- Indian Agate**—Moss agate.

- Iris Agate**—Agate which shows iridescence when cut across its concentric structure.
- Jasp - Agate**—Intermediate between jasper and chalcedony with predominant opaque jasper.
- Jasper Agate**—Chalcedony banded with jasper.
- Jasponyx**—Onyx, part or all of which is jasper rather than chalcedony.
- Landscape Agate**—Moss agate with markings resembling landscape scenes.
- Leopard Agate**—Moss agate with uniformly distributed black stellated inclusions in translucent gray ground.
- Mocha Agate**—Moss agate from the vicinity of Mocha, an Arabian seaport, at the entrance to the Red Sea. It is a white or gray chalcedony showing black, brown or red dendritic markings resembling trees and plants.
- Mocha Pebble**—Same as the Mocha agate.
- Mocha Stone**—Same as Mocha agate.
- Montana Agate**—Moss agate from Montana.
- Moss Agate**—Chalcedony with greenish to blackish moss-like inclusions. Finest comes from India.
- Moss Jasper**—Chalcedony, opaque or translucent, full of moss-like markings.
- Myrickite**—Agate or chalcedony containing bright red cinnabar inclusions, often dendritic.
- Nicolo**—Quartz, onyx, base black or brown, with top layer wavy bluish white.
- Occidental Agate**—Agate, less perfect than oriental agate.
- Onicolo**—Quartz, onyx, used for cameos, the white top layer has a bluish tinge.
- Onychite**—Quartz, onyx.
- Onyx**—Applied to various banded or clouded rocks with prefixes of different type. (2) Chalcedony, banded, usually cloudy milk-white and some other color, usually black; the bands are very regular layers.
- Onyx Stone**—Quartz, onyx.
- Opal Agate**—Opal, banded in alternate layers of opal and agate.
- Oriental Agate**—Agate, finely marked and very translucent.
- Oriental Moss Agate**—Moss agate from the trap rocks of western India where it is common.
- Oriental Onyx**—Aragonite, banded, mottled or clouded stalagmites; (2) unusually beautiful quartz onyx.
- Petoskey Agate**—Quartz, beekite, cemented and silicified fossil coral.
- Pictorial Agate**—An agate resembling human portraits and natural frames.
- Picture Agate**—An agate with markings that resembles a picture.
- Polka-dot Agate**—Generally a white to grayish chalcedony with small dots of brown, red, black, etc.
- Porcelain Agate**—A very white agate resembling porcelain.
- Rainbow Agate**—Same as Iris agate.
- Riband Agate**—Agate in wide parallel bands.
- Ribbon Agate**—Banded agate, when lines are thin and nearly straight.
- Ring Agate**—Agate with concentric circular bands.
- River Agate**—Moss Agate pebbles from stream beds.
- Ruin Agate**—Agate, bands in parallel layers brecciated to resemble ruins.
- Sardian Onyx**—Sardonyx.
- Sardian Stone**—Same as Sardian onyx.
- Sardony**—Sardonyx.
- Sardonyx**—Chalcedony, alternate bands of white and brown.
- Sarturnine Onyx**—Onyx of very dark colors.
- Scenic Agate**—Moss agate whose inclusions resemble landscapes.
- Scotch Pebble**—Agate; also smoky quartz (cairn gorm).
- Semi-Carnelian**—Agate, yellow.

Shell Agate—Agate, when it parts into thin shell-like slabs.

Shinarump—Agatized wood.

Spotted Agate—Agate, when the colors appear in irregular spots bearing

ing more or less of resemblance to clouds, stars, landscapes, etc.

Striped Agate—Agate with wide parallel bands.

Swiss Lapis—Agate or jasper artificially colored blue.

Texas Agate—Agate-jasper from Texas.

Topographic Agate—Agate with markings that resemble a topographic map showing contour lines, forests, lakes, etc.

Tree Agate—Moss agate with dendrites resembling trees.

Tree Stone—Moss Agate.

Water Agate—Chalcedony containing water bubble.

Wax Agate—Yellow agate with pronounced waxy luster.

White Agate—Chalcedony.

Wood Agate—Wood petrified or replaced by agate.

AGATE—A dollar bill & 10c in stamps

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- 2 lbs. Sard, unpolished
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- 2 pcs. Moss Agate, 1x3, Antelope, pol.
- 3 pcs. Polkadot Agate, 1x2, polished

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Scheelite, pure masses, 1x1" .. 10c
Colemanite, brilliant xls, 1x1" 10c

Wollastonite, fibrous masses,
1x2" 10c
Pricelte, snow white masses 1x1" 10c
Gay Lussite, ¼ to ½" xls, 6 for 25c
Analcite, xls in rock, 1x1" 10c
Lawsonite, xls in schist, 1x1" .. 10c
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Bethlehem, Pa.—Congratulations on the 10th Anniversary of so beneficial a publication. I am renewing my subscription. Please reserve for me 3 extra copies of the 10th Anniversary Number. May the 20th Anniversary Number be twice as big and successful. Best wishes.—F. R. Faux.

It's a Privilege!

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Wants a Book on Quartz!

Philadelphia, Pa.—I am enclosing a donation of \$2.00 towards the 10th Anniversary Number of ROCKS and MINERALS. You are doing a great thing in getting together articles on quartz. I still cannot understand why we do not have books on this one mineral alone.—Wm. Ralph Hoffa.

So Do We!

Lyndon, Kans.—I would like to express my appreciation of ROCKS and MINERALS. I think it's swell.—James Burton.

A Hot Tip!

Austin, Minn.—Here is my check for \$1.50 in reply to the request of President Doherty in the July issue. I sincerely hope everyone reads this and will act before it grows cold.—Elmer N. Anderson.

We Are Appreciated in Africa!

Northmead, Transvaal, S. Africa—Please find enclosed money order covering another year's renewal. I would like you to realize how much ROCKS and MINERALS is appreciated and looked forward to by me. Good luck to ROCKS and MINERALS.—T. Edgar Simmons.

Rocks & Minerals a Good Educator!

Salt Lake City, Utah.—Enclosed find M. O. for \$3.50 of which \$3.00 is payment for two renewals; 25c is for a Membership Certificate; and the remaining 25c to help bring out the Special Anniversary Number.

Thanks to ROCKS and MINERALS I was not the dumbest student at the Prospector's Class held at the University of Utah last winter.—E. J. Rordell.

Makes Friends!

West Orange, N. J.—Thank you for the back numbers of ROCKS and MINERALS. I find myself enjoying them quite out of proportion to the subject matter that they contain. It took me some time to realize that what appealed to me was the spirit of sincerity, desire to share, and good fellowship that pervades them and which can only be a direct personal tribute to the Editor.—Horace A. Woodward.

I Can't Do Without You!

New York, N. Y.—ROCKS and MINERALS is practically indispensable; I wouldn't be without it.—John L. Baum.

Keeps the Mind Healthy!

Newport News, Va.—I want to congratulate you on reaching the 10th milestone in this wonderful publication and work. Affiliation with ROCKS and MINERALS tends to keep ones mind above "muck" and in a healthy, active condition.—George C. Barclay.

Not Racketeers!

Bessemer, Pa.—One thing I notice about the mineral dealers, and that is they don't try to make a racket out of collecting, like most of the coin dealers do.—Chas. Weltz.

A Good Figure!

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New York, N. Y.—Enclosed is check for \$5 as a donation towards the 10th Anniversary Number of ROCKS and MINERALS. I admire the magazine very much and the editor's efforts to keep up its high trend.—R. H. Van Esselstyn.

Hurrah for Agates!

Winona, Minn.—A splendid idea—Agates Whoopie-Whoopie! Hurrah for the Agate Number!—R. R. Loppnow.

Takes No Chances!

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THE ARTIFICIAL COLORING OF AGATES

By E. V. Van Amringe

Chemical treatment of agates and other forms of chalcedony to enhance their natural color began at Idar, Germany, about 1820. It is quite impossible that the art was known to the ancients, although it may have been practiced by the Italian cameo workers of the Middle Ages. Certainly no specimen of artificially colored material of great age has survived to us. At present, however, the great majority of commercial agates possess a far more brilliant color than that imparted to them by nature. Banded forms of chalcedony are most successfully treated, as the layers differ considerably in porosity, and therefore in the quantity of coloring matter they will absorb.

BLACK was the first color produced. The well dried stone is soaked for two to three weeks in a dilute sugar solution (13 ozs. sugar to 1 qt. of water) or honey solution or olive oil. The temperature should be moderately warm. The stone is then washed, immersed in concentrated sulphuric acid, and slowly warmed for one hour. Then the acid is carefully boiled from fifteen minutes to one hour. This rather dangerous operation may be avoided by allowing the stone to remain in the warm acid for one hour and cooling and repeating the warming process. If too intense color is obtained it may be

softened by treatment with nitric acid. To keep the stone from "sweating", it should be carefully washed and dried for several days at a moderate temperature.

The black color is of course due to carbonization of the organic compound, and the effect produced resembles closely the true onyx.

RED is generally formed by ignition after immersion in iron nitrate solution. This is prepared by dissolving eight ounces of iron nails in two pounds of concentrated nitric acid, the product being decanted until clear. The stones are soaked in this liquid for two weeks for those about 2mm. thick, to four weeks for those about 10mm. thick. Success is seldom obtained with thicker specimens, and drying and repetition of the process is recommended in all cases. After the agate is thoroughly soaked with the iron salt, it is dried at a gentle heat from two to ten days according to thickness, and without cooling heated red hot in a crucible. Both the ignition and the final cooling must be slowly and evenly performed if fracture of the stone is to be avoided. Artificial carnelian and sardonyx are the result.

BLUE color is produced by soaking the stone in a lukewarm solution of potassium ferrocyanide (yellow prussiate of potash) (9 ozs. to 1 qt. of water) for one or two weeks. After washing, the agate is left for eight or ten days in a saturated solution of ferrous sulfate, rewashed and dried slowly. The latter process may be

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repeated until the desired shade is obtained. A darker color results from the addition of both concentrated sulfuric and nitric acids to the ferrous sulfate solution, or potassium ferrocyanide (red prussiate of potash) may be substituted for the yellow prussiate. These blue chalcedonys are the so-called German or Swiss lapis, or imitation lapis lazuli.

GREEN of a bluish shade results from immersion in a saturated solution of potassium dichromate for from whom one week to two months (for stones of one half inch in thickness). The specimen is then transferred to a closed container and exposed to the fumes from lump ammonium carbonate for two weeks. After drying it is gradually and strongly heated until the desired tint is produced. Apple green color is obtained from a similar procedure in a solution of nickel nitrate. The ammonium carbonate treatment may be omitted. The resulting stones resemble chrysoprase.

BROWN of a rich hue, giving the appearance of some garnets, is produced by soaking the material in brown sugar for some time, and then carefully igniting.

YELLOW of a lemon shade results from continued digestion in warm crude concentrated hydrochloric acid or potassium dichromate solution.

FANCY COLORS obtained by simple dyeing with aniline dyes inevitably fade on exposure to light and eventually disappear.

A general procedure which must be followed in every experiment in artificial coloring is the careful removal from the specimen of oils or substances of an undesirable color. This may be accomplished by a bath in a caustic soda solution, followed by drying and soaking in warm dilute nitric acid for two or three days. The acid should finally be brought to boiling. Continued repetition of this procedure may be necessary to completely free the stone from iron and other stains.

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MOSS AGATE

(Continued from Page 189)

growths become thin or thick and then wind their way up to the top of the liquid. It is interesting to observe how little bubbles of air aid the rising and it is equally interesting to watch the circulation of green iron solution within the pipes and the exudation of it at the end. A good lens will help in these observations.

After a few hours the process comes to a standstill and the next stage, oxidation, begins. Air enters from the surface of the liquid, the tips of the "moss" become brownish and finally the precipitated silica becomes striated and enters into the stage of hardening by loss of water. In time, real, genuine moss agate would be formed.

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AGATE BIBLIOGRAPHY

By PETER ZODAC
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Anonymous. *Minerals of Arkansas*. Issued by Bureau of Mines, Manufactures and Agriculture, State of Arkansas (Little Rock), 1925, p. 10.

Moss Agate, Wyoming. THE MINERAL COLLECTOR, Vol. 12, No. 10, Dec. 1905, p. 149.

Texas Agate. THE MINERAL COLLECTOR, Vol. 12, No. 9, Nov. 1905, p. 133.

Aitkens, I. *Quartz Gem Stones*. U. S. Bureau of Mines, INFORMATION CIRCULAR, No. 6561, Washington, March 1932, p. 5.

Alessi, A. Joseph. *Hunting Agates Around Lake Superior*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, p. 139.

Bates, Albert C. *Concerning Quartz, Part 4*. THE MINERAL COLLECTOR, Vol. 3, No. 7, Sept. 1896, p. 97-99.

Quartz and Its Varieties, Part 6. THE MINERAL COLLECTOR, Vol. 2, No. 9, Nov. 1895, p. 132.

Dendritic Agate. THE AMERICAN INVENTOR, Feb. 1, 1903, p. 95.

Moss Agate in the Black Hills. THE AMERICAN INVENTOR, July 1905, p. 39.

Nature's Photograph in Agate. THE AMERICAN INVENTOR, June 15, 1904, p. 273.

The Agate-Its Occurrence and History, Part 1. THE AMERICAN INVENTOR, Dec. 1, 1903, p. 255.

Bates, Albert C. *The Agate-Its Occurrence and History, Part 2*. THE AMERICAN INVENTOR, Jan. 1, 1904, p. 10.

Water Agates. THE AMERICAN INVENTOR, Dec. 1905, p. 179.

Beck, Herbert H. *The Minerals of Lancaster County*. Publication of the Linnean Society of Lancaster County, Lancaster, Penn., 2nd Edition, 1934, page 3.

Bixby, Maynard. *A Catalogue of Utah Minerals and Localities*. Salt Lake City, Utah, 4th Edition, 1916, pp. 5, 18.

Blair, Jonathan M. *Agate*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 160-164.

Bowman, H. L. See Miers, Henry A.

Cahen, Edward. *Jelly Chemistry*. ROCKS and MINERALS, Vol. 3, No. 4, Dec. 1928, pp. 112 - 116.

Canfield, Frederick A. *A Catalogue of Minerals Found in New Jersey*. Final Report of the State Geologist, Vol. 2, Issued by the State Geological Survey of New Jersey, Trenton, 1889, p. 3.

Chandler, Wm. C. *Mule Spring, California - An Interesting Locality for Geodes, Jaspers and Agates*. ROCKS and MINERALS, Vol. 10, No. 5, May 1935, p. 69.

Cleaveland, Parker. *An Elementary Treatise on Mineralogy and Geology*, Boston, Mass., 1822, pp. 267, 270, 307.

Clinesmith, C. N. *A Blue Agate Occurrence in Washington*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, p. 136.

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Dana, Edward Salisbury. *A Text Book of Mineralogy*. John Wiley and Sons, New York, 2nd Edition, 1898, p. 326.

Minerals and How to Study Them. John Wiley and Sons, New York, 2nd Edition, 1897, p. 279.

The System of Mineralogy of James Dwight Dana 1837-1868. John Wiley and Sons, New York, 6th Edition, 1920, p. 189.

Dana, James D. *Manual of Mineralogy*. Durrie & Peck, New Haven, 1851, p. 135.

Manual of Mineralogy. Peck & Coan, New Haven, new edition, 1870, p. 135.

Dustin, Fred. *The Gems of Isle Royale, Michigan*. Reprinted from Papers of the Michigan Academy of Science, Arts and Letters, Vol. XVI, 1931, Published 1932, pp. 391-392.

Agates of the Lake Superior Region. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 152-155.

Eakle, Arthur S. *Minerals of California*. California State Mining Bureau, San Francisco, Bull. 91, Nov. 1922, p. 87.

Ehrman, A. H. *A Remarkable Mineral Locality*. THE MINERAL COLLECTOR. Vol. 2, No. 9, Nov. 1895, p. 139.

Ellermeyer, G. B. *Some New Mexico Agates*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, p. 167.

Sweetwater River Moss Agates. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 172-173.

Emanuel, Harry. *Diamonds and Precious Stones*. John Camden Hotten, London, 1867 pp. 36, 43, 170-172.

English, George Letchworth. *Getting Acquainted with Minerals*. Mineralogical Publishing Co., Rochester, N. Y., 1934, pp. 89, 96, 100, 101, 237.

Fairbanks, Harold W. *Stories of Rocks and Minerals for the Grammar Grades*. Educational Publishing Co., Boston, 1903, pp. 72, 74.

Footo, W. M. *Complete Mineral Catalog*. Footo Mineral Company, Philadelphia, 12th Edition, 1909, p. 70.

Forbes, P. L. *Polka-dot Agate in Oregon*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 168-169.

Ford, William E. *Dana's Manual of Mineralogy*. John Wiley & Sons, New York, 13th Edition, 1912, p. 176.

Freehan, P. A. *"Agates in the Canal Zone."* ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 170-171.

Genth, F. A. and Kerr, W. C. *The Minerals and Mineral Localities of North Carolina*. Raleigh, N. C., 1885, p. 41.

Harstad, A. J. *"The Agate"*. ROCKS and MINERALS, Vol. 2, No. 1, March 1927, p. 3. *"Agates and Such"*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 140-150.

Hawkins, Alfred C. *The Book of Minerals*. John Wiley & Sons, New York, 1935; pp. 70, 71, 72.

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Holden, Edward Fuller. See Kraus, Edward Henry.

Hopping, Roy. *Catalogue and Price List of Minerals*. New York, 1899, p. 16.

Hunt, Dr. Joseph H. *Some Non-Metallic Minerals of Mexico*. THE MINERAL COLLECTOR, Vol. 1, No. 1, March 1894, p. 5.

Hunt, Walter Fred. See Kraus, Edward Henry.

Kerr, W. C. See Genth, F. A.

Kraus, Edward Henry, and Holden, Edward Fuller. *Gems and Gem Materials*. McGraw-Hill Book Co., New York, 1st Edition, 1925, pp. 85, 93, 143, 150, 206.

Gems and Gem Material. McGraw-Hill Book Co., New York, 2nd Edition, 1931, pp. 83, 95, 108, 175, 176, 242.

and Hunt, Walter Fred. *Mineralogy*. McGraw-Hill Book Co., New York, 2nd Edition, 1928, pp. 249, 366, 498, 554, 584.

Kunz, George Frederick. *Gems of Quartz Origin*. THE MINERAL COLLECTOR, Oct. 1896, Vol. 3, No. 8, p. 119.

History of the Gems Found in North Carolina. Issued as Bull. 12 by the North Carolina Geological and Economic Survey, Raleigh, 1907, p. 35.

How Gems Change Color. THE MINERAL COLLECTOR, Vol. 3, No. 6, Aug. 1896, p. 95.

Loomis, Frederic Brewster. *Field Book of Common Rocks and Minerals*. G. P. Putnam's Sons, New York, 1923, pp. 107-108.

Manchester, James G. *The Minerals of New York City and Its Environs*. New York Mineralogical Club, New York, Vol. 3, No. 1, Jan. 1931, pp. 65, 67, 75, 77, 79, 81, 84, 85, 86, 87, 88, 91, 94, 95.

Miers, Sir Henry A. and Bowman, H. L. *Mineralogy*. MacMillan and Co., London, 2nd Edition, revised, 1929, pp. 308, 436-437.

Moore, N. F. *Ancient Mineralogy*. Harper & Brothers, New York, 1859, pp. 234-235.

Morgan, P. G. *Minerals and Mineral Substances of New Zealand*. Geological Survey of New Zealand, Bull. No. 32, Wellington, 1927, pp. 6-7.

Mather, William W. *Geology of New York, Part 1*. Albany, 1843, p. 282.

Oakenfull, J. C. *Brazil in 1912*. London, England, 1912, p. 304.

Papke, Hermann. *A Visit to the Mineral Localities at Paterson and Great Notch, N. J.* THE MINERAL COLLECTOR, Vol. 15, No. 8, Oct. 1908, p. 114.

Patton, J. W. *Story of the Mint Canyon Agate Beds*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 156-159.

Rand, J. C. *Minerals of Massachusetts, Part 4*. THE MINERAL COLLECTOR, Vol. 5, No. 2, April 1898, p. 29.

Reamer, Louis. *Agate Found in an Old Abandoned Quarry*. ROCKS and MINERALS, Vol. 4, No. 4, Dec. 1929, p. 109.

Robinson, Samuel. "A Catalogue of American Minerals with their Localities." Boston, 1825. (See page 178 in this issue).

Sanford, Samuel. See Schrader, Frank C.

Schrader, Frank C., Stone, Ralph W., and Sanford, Samuel. *Useful Minerals of The United States*. U. S. Geological Survey Bull. 624, Washington, 1917, pp. 16, 34, 42, 81, 97, 107, 163, 180, 187, 204, 229, 248, 269, 289, 298, 342.

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Smith, G. F. Herbert. *Gem Stones and their Distinctive Characters*. Brentano's New York, p. 247.

Sowerby, Henry. *Popular Mineralogy*. Reeve and Benham, London, 1850, pp. 85-88.

Stone, Ralph W. See Schrader, Frank C.

Tracy, J. M. *Hunting Beach Agates*. ROCKS and MINERALS, Vol. 6, No. 3, Sept. 1931, p. 112.

Ulke, Titus. *The Agates and Jaspers of The Atlantic Coastal Plain*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 174-175.

Valient, W. S. *New Jersey Mineral Localities, Part 1*. THE MINERAL COLLECTOR, Vol. 11, No. 8, Oct. 1904, pp. 123, 124.

New Jersey Mineral Localities, Part 2. THE MINERAL COLLECTOR, Vol. 11, No. 9, Nov. 1904, pp. 137, 139.

Van Amringe, E. V. *The Artificial Coloring of Agates*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 194-195.

Von Bernewitz, M. W. *Handbook for Prospectors*. McGraw-Hill Book Co., New York, 2nd Edition, 1931, p. 138.

Wade, Frank B. *A Text Book of Precious Stones*. G. P. Putnam's Sons, New York, 1918, pp. 128, 138, 172, 197.

Ward's Natural Science Establishment. *Minerals*. Rochester, N. Y., 1935, p. 18.

Autumn Bulletin of the Department of Mineralogy. Rochester, N. Y., Price List 350, Sept. 1931, p. 18.

Wherry, E. T. *The Causes of Color in Minerals*. THE MINERAL COLLECTOR, Vol. 11, No. 6, Aug. 1904, p. 88.

Wild, George O. *How Agates Form in Nature*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 176-177.

Moss Agate. ROCK and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 189-196.

Weidhaas, Ernest. *Freak Simulations in Agate*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 131-136.

Wodiska, Julius. *A Book of Precious Stones*. G. P. Putnam's Sons, New York, 2nd Edition, 1909, pp. 176, 177, 178, 180, 191.

Zodac, Peter. *Agates Along the Atlantic Coast*. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 182-188.

Agate Bibliography. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 197-200.

Agate Glossary. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 190-192.

Agate, Some Facts and Uses. ROCKS and MINERALS, Vol. 11, No. 9, Sept. 1936, pp. 137-138.

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